
BULLETIN

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Cover: A successful hunt. (From left) Ralph Shepstone, Joan Moore, David Lawrence, Jerry Reynolds and Mike Dloogatch admire a large copperhead (*Agkistrodon c. contortrix* × *mokasen*) as it crosses the road during a 1990 trip to the coastal plain of North Carolina. Photograph by Stephen L. Barten.

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Hitting the Kingsnake Jackpot: “Good” Snakes, Technology and Bushmasters in the Carolinas

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The first herp was a box turtle. The Charlotte airport was less than an hour behind us, and our caravan of three cars was heading for the North Carolina sandhills at a rapid pace. In that split second of recognition, Jerry and I saw it wasn't your run of the mill box turtle — no drab, common, pet store three-toed, no sir. This was a gorgeous *Terrapene carolina carolina*, and finding it in Carolina seemed appropriate. The rich chocolate browns starkly contrasted by lemon-yellow blotches were just as quickly obscured by the tire of the car in the next lane. It clipped the turtle and sent it skittering like a hockey puck across our lane and far onto the shoulder.

“Turtle! We're going back!,” I shouted into the Talkabout walkie-talkie. These little gizmos were going to be great. Forewarned of our intentions, the trailing cars followed our quick U-turn like a precision drill team, but we had been going too fast and had overshot the turtle by quite a distance. The turtle made good its escape before we got back to the spot. Still, the herping had started.

Jerry Reynolds is my best friend from my undergraduate days at North Carolina State University. While attending school we shared various salaried and volunteer positions in the zoology and herpetology departments of both the school and the North Carolina State Museum of Natural History. Both afforded us ample opportunity to study the herpetofauna of the state and to make numerous field trips to observe it firsthand. Jerry still lives in North Carolina and he was our secret weapon, our guide, who would direct us to the most productive sites. In fact we had high expectations of Jerry, since he had served as our guide on a previous and very successful herping trip to the state in 1990. Gery Herrmann and Ralph Shepstone followed in a rental car, and Mike Dloogatch and Don Wheeler brought up the rear in Mike's Jeep.

Let me take a moment to editorialize about what makes a good herping trip. Obviously the success of a trip depends on the goals of the participants. Our participants are well versed in herpetology and we appreciate all manner of herps from large to small, but we wanted to see snakes. In fact we all pretty much fit a recent description of the “typical” zoo herpetologist (Murphy and Card, 1998): interest in herps as children; interest escalating to obsession; decreased social interaction with non-herpetologists; interest in plants limited to cacti, succulents and carnivorous plants (one highlight of our trip was seeing Venus flytraps, pitcher plants and sundews); interest in other animals — whether mammal, bird, fish, or bug — limited to carnivores; and interest in herps definitely focused on snakes.

Even among snakes, some species are more desirable than others. Whether or not the herper wants to keep a snake he finds, and I'm happy to say we were there to see and photograph them rather than keep them, some snakes generate more excitement than others. Snakes that eat mice, and therefore have pet

potential, seem more exciting than those which eat amphiumas (mud snakes, *Farancia abacura*), crayfish (queen snakes, *Regina septemvittata*) or centipedes (crowned snakes, *Tantilla coronata*). Brightly colored snakes score high as well: scarlet kings, *Lampropeltis triangulum elapsoides*, are better than eastern kings, *L. g. getula*, and corn snakes, *Elaphe guttata*, are better than black rat snakes, *Elaphe o. obsoleta*. Food preference supersedes color — a black rat snake is probably more fun than a shiny and brightly colored, but salamander-eating, ringneck snake, *Diadophis punctatus*, to most snake hunters. Venomous snakes are exciting too. It's an artificial value system, yet our very human nature forces us to subscribe to it.

The coastal plain of North and South Carolina is home to most of the same snakes found in Georgia and Florida. The tricolored kingsnake found here is the scarlet kingsnake. Its small size — usually less than 20 inches — and its high-strung nature make it a more challenging pet than most larger, captive-bred tricolors like Pueblan milksnakes, *L. t. campbelli*, or Honduran milksnakes, *L. t. hondurensis*. Because it lives in the eastern United States this species is more likely to be seen in the wild by a herper than any of the Central American subspecies. Scarlet kings seem more common, or perhaps just less secretive, than the tricolors seen in the western United States, for example the New Mexico milksnake, *L. t. celaenops*, or the central plains milksnake, *L. t. gentilis*. The “yellow” bands tend to be bright white in juveniles and off-white in adults from the Carolinas, rather than the bright canary yellow seen in Florida specimens. Finding a scarlet king feels like hitting a home run; it makes a trip seem somehow more complete. I have had that pleasure twice before in North Carolina, both under amusing circumstances (Barten, 1979), and Ron Humbert found one swimming across a flooded road at night during a driving thunderstorm on our 1990 trip.

The other kingsnakes found in the coastal Carolinas are the eastern kingsnake, *L. g. getula*, and the mole kingsnake, *L. calligaster rhombomaculata*. The eastern king is sometimes called the chain king for its chainlike white markings on a lustrous black background. In some individuals the white markings are pencil thin, while in others they are half an inch wide. Like the scarlet king, the white markings tend to be stark white in Carolina specimens, but can be yellow in those from Georgia and Florida. Eastern kings grow to lengths of six feet and often have impressive girths. The mole king is the eastern subspecies of the more familiar prairie kingsnake, *L. c. calligaster*. Like the corn snake this is a highly variable species. Individuals are some shade of khaki brown, with numerous small, darker blotches on their backs. The background can vary from a very pale café au lait to a deep chocolate color. The blotches in some adults fade and may be all but invisible, while in other specimens they are dark and vivid, almost maroon in color. Some have distinctly reddish patterns and re-

semble corn snakes. Mole kings are smaller than eastern kings, averaging 30 to 40 inches in length. They are also more secretive and harder to find. Kauffeld (1957) described the eastern king as among the most numerous snakes he encountered in South Carolina, yet never even mentioned the mole king. We found three eastern kings in 1990 but the only mole kings we saw were dead-on-the-road (DOR).

Corn snakes were also high on our want list. In fact, the brightly patterned Okeetee phase corn snake so commonly seen on herp price lists is named for South Carolina's Okeetee Hunt Club, which was immortalized by Carl Kauffeld (1957). He states:

On the Okeetee, Corn Snakes are among the most numerous snakes and they grow to greater size and greater beauty than any I have known from elsewhere. The range of variation in color intensity and pattern, over an area of at most ten square miles is amazing. Some have a ground color of mouse gray with dark scarlet blotches, others—the prettiest [the ones now called “Okeetee phase”]—have a rich orange ground color with vermilion blotches. It is odd that the lighter-colored snakes usually have fewer body blotches, and there is no sexual correlation so far as I can tell. In my estimation the Corn Snake is not only the most beautiful nonpoisonous snake in the United States, but in the world as a whole.

There is some irony that a particular corn snake color phase is named for an area where the “range of variation . . . is amazing.” On previous trips, including the 1990 one, we had seen a number of DOR Carolina corn snakes but the closest thing I had ever seen to a live specimen was MWOR (Mortally Wounded On Road).

The eastern coachwhip, *Masticophis f. flagellum*, is a large, swift, magnificent snake. The front half of the body is dark brown or black, while the back half is pale brown. The scale pattern makes this snake resemble a braided leather whip. Jerry once found a coachwhip measuring seven feet ten inches. Our group previously had found them to be numerous in Oklahoma—and difficult to catch due to their wariness and speed—but they were scarce or secretive in North Carolina and had been limited to a single DOR on the 1990 trip.

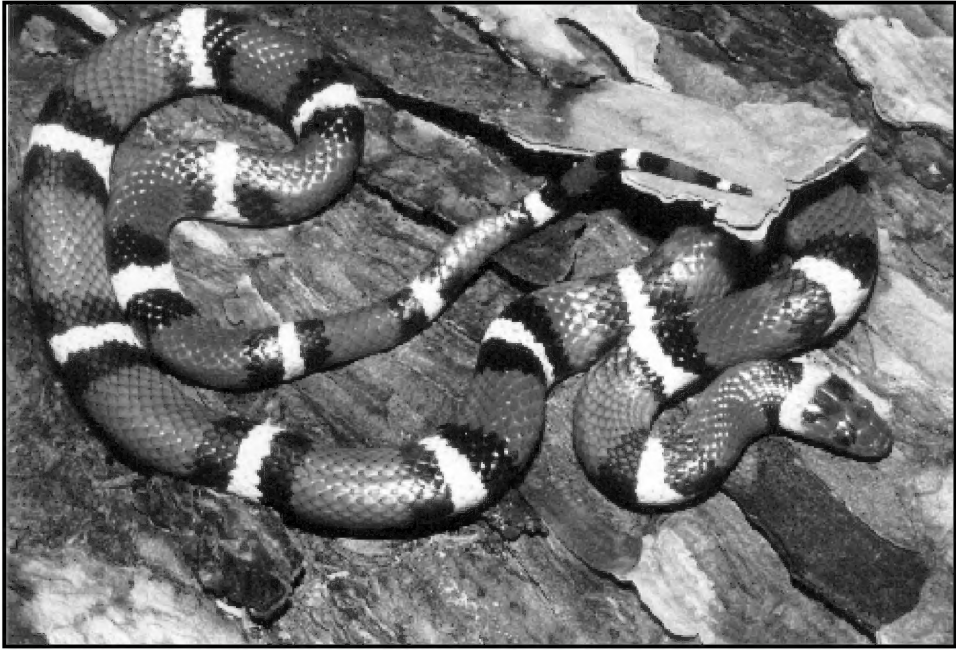
The pine snake, *Pituophis m. melanoleucus*, is a large, robust, starkly black-and-white serpent related to the bullsnake. It is found in scattered locations with sandy soil along the east coast. Pine snakes are known from the North Carolina sandhills, but are both rare and secretive in their habits; in fact they are protected in North Carolina and collection is prohibited. Pine snakes are always on the want list of any herp trip to the sandhills, but at the same time are rare enough that the chance of seeing one is very low. We saw a single DOR specimen in 1990, and none on this trip.

There are five species of venomous snakes in the Carolina coastal plain, six if you count the rare and fossorial coral snake, *Micrurus fulvius*. Three of these are rattlesnakes: the eastern diamondback, *Crotalus adamanteus*, the timber (or canebrake, as it is called locally), *C. horridus*, and the pigmy, *Sistrurus miliarius*. As is the case throughout most of its range, the eastern diamondback has been all but extirpated by habitat destruction. It favors undisturbed habitats and we selected against finding it by concentrating on disturbed habitats—abandoned houses and farm buildings. The timber rattle-

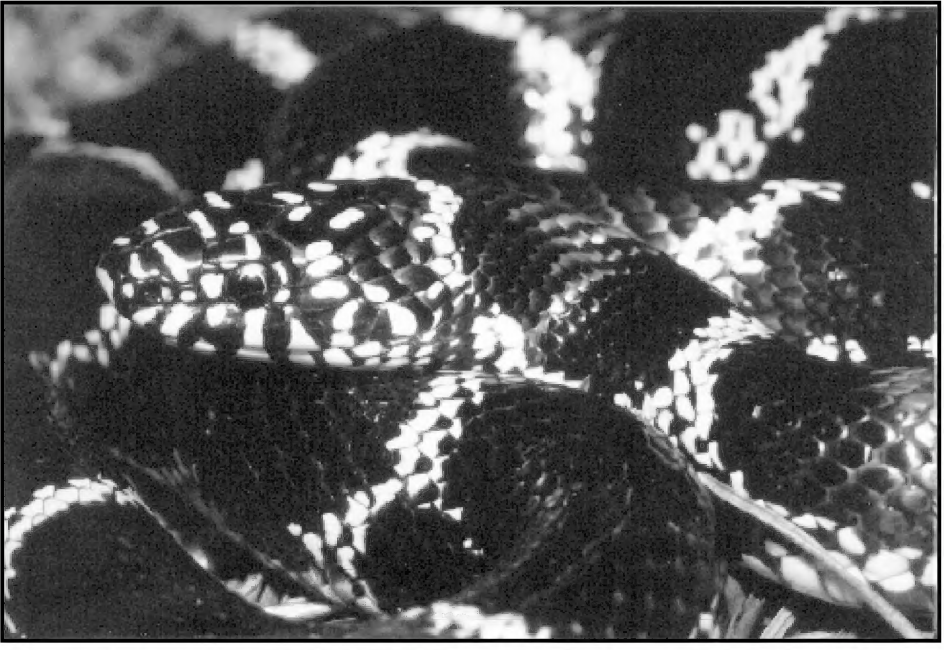
snake used to be divided into two subspecies, the timber and the canebrake, but the division was later determined not to be valid. Of the three, these are the most commonly encountered rattlesnakes, but encounters are still rare. North Carolina hosts a lovely red phase of the pigmy rattlesnake in addition to the more common gray phase, but it is both protected and more common farther north than we visited. Rattlesnakes would not make our list on this trip, but cottonmouths, *Agkistrodon piscivorus*, and copperheads, *Agkistrodon contortrix contortrix* × *mokeson*, were both common and easily found.

After “good snakes” in the title, I promised to emphasize technology. We were nothing if not prepared with modern equipment. I'm not talking bags and hooks here, but rather electronics. The Talkabouts were already mentioned. These are powerful radios using family radio service (FRS) wave bands, and thus no license or fees are required. They have a range of two miles and offer 14 channels. One of our strategies was to split up in order to increase our chances of finding more specimens, and these radios allowed us to stay in touch or call the other parties over to see a nice specimen. Jerry also had a Global Positioning System (GPS) device, which could plot the longitude and latitude of our location at any moment, but also provided instant maps of major roads and towns. He used it to record the location where we found any species that were poorly documented in museum collections. However, GPS was not without its limitations, as we were soon to find out. We even had a laser pointer, which proved useful in demonstrating the location of a hard-to-see herp without disturbing it to those who had trouble spotting it. On past trips, for recording our specimens we used to rely entirely on 35 mm slide film. Ralph and Don had on occasion brought along 8 mm video cameras, with excellent results. Slides offer versatility for both lectures and publications, but the video captures behavior and interesting background conversation. This time I brought my usual 35 mm camera with macro lens “just in case,” but added a digital video camera the size of a paperback book. Of course we had a couple cellular telephones for emergencies. The gadgetry prompted discussions of the future of herping field trips. It would not be impossible to bring a laptop computer, digital camera and cell phone, and upload images from the trip to a web page while still in the middle of a swamp. Our consensus was that technology added immensely to the enjoyment of the trip.

After all this idle chatter, I'm happy to say that we actually got out in the field and went herping. We arrived in the Sandhills Gamelands after lunch in overcast, but warm and humid weather. The area is crisscrossed by fine dirt roads and Jerry provided each car with a map. Our plan was to split up for the afternoon, then meet at a rendezvous point to share our experiences. We located a landmark on the map for this purpose, a large lake named “Crappie Lake” right on a big road. It would be easy to find and would provide some exploration for the first party to arrive while they waited for the others. A crappie is a kind of fish. In the north, the word is pronounced “crop-y,” while southerners use a the somewhat more vulgar “crap-y.” We would come to use the southern pronunciation. It was unfortunate that no one noticed a lack of road names on the maps.



The scarlet kingsnake (*Lampropeltis triangulum elapsoides*) that Jerry found under the bark of a dead pine tree during the first hour of our trip.



One of five eastern kingsnakes (*Lampropeltis g. getula*) we found in and around the Francis Marion National Forest, in South Carolina.



This was the lightest colored of the three mole kingsnakes (*Lampropeltis calligaster rhombomaculata*) we saw. The snake's dorsal blotches are faded and all but invisible.



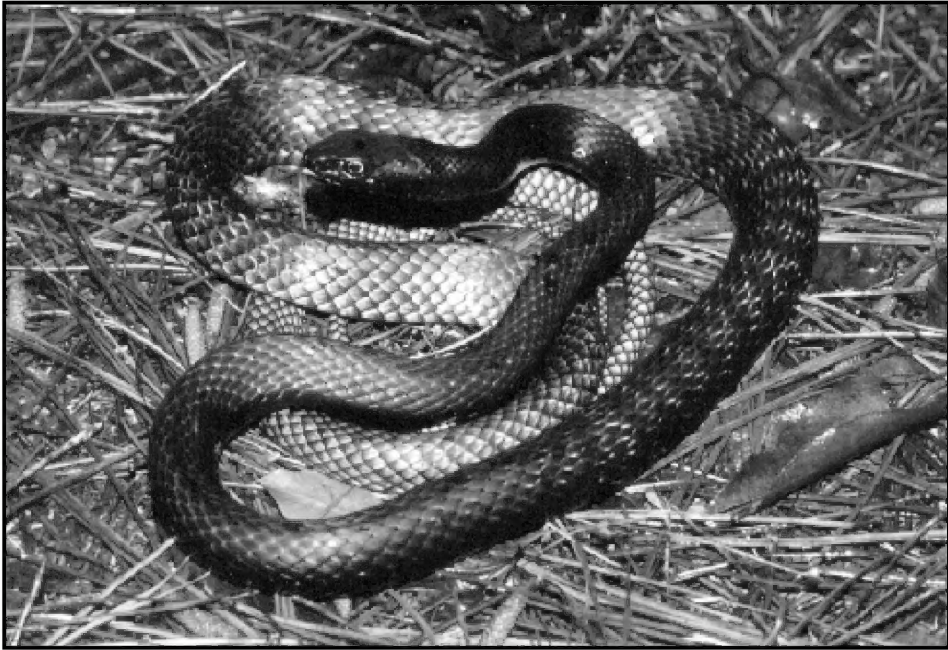
This was the darkest of the mole kingsnakes we found. It too has faded dorsal blotches, but the background color is much darker than that of the first mole king.



The last mole kingsnake had a vivid pattern with distinct reddish highlights. It superficially resembled a corn snake in color.



This large, muscular corn snake (*Elaphe g. guttata*) measured almost five feet, and was snatched off the road just before an approaching truck would have run it over.



One of two eastern coachwhip snakes (*Masticophis f. flagellum*) that were found under tin on a cold, rainy day with a high temperature of 56°F. The cold weather made this normally swift and wary snake easy to catch and pose for photographs.



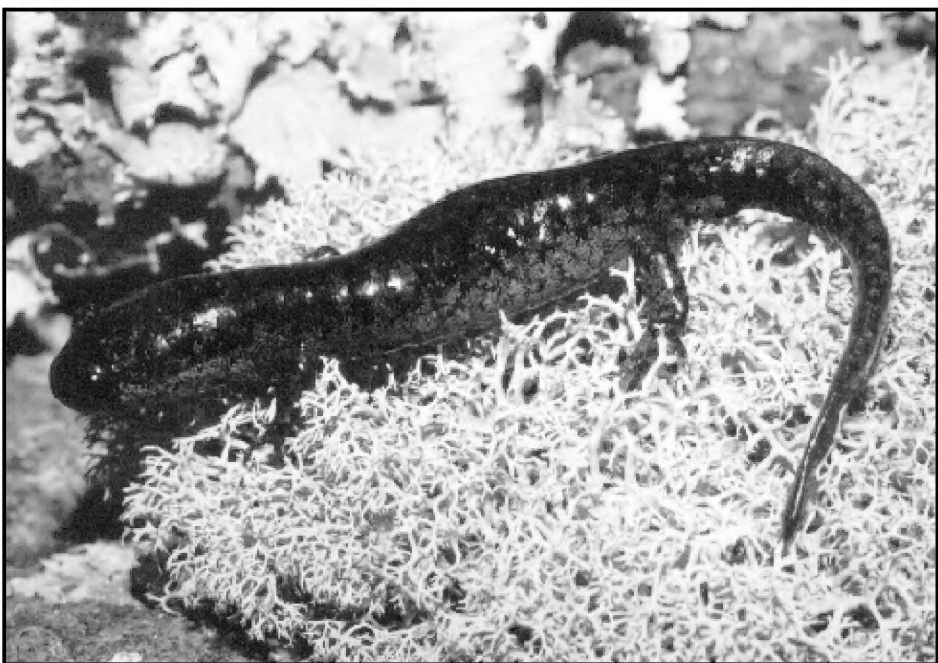
A large copperhead (*Agkistrodon c. contortix* × *mokasen*) was located under a pile of boards. It remained coiled while the rest of the pile was searched, and even while leaves and sticks were removed from its back using tongs to make for a less cluttered picture.



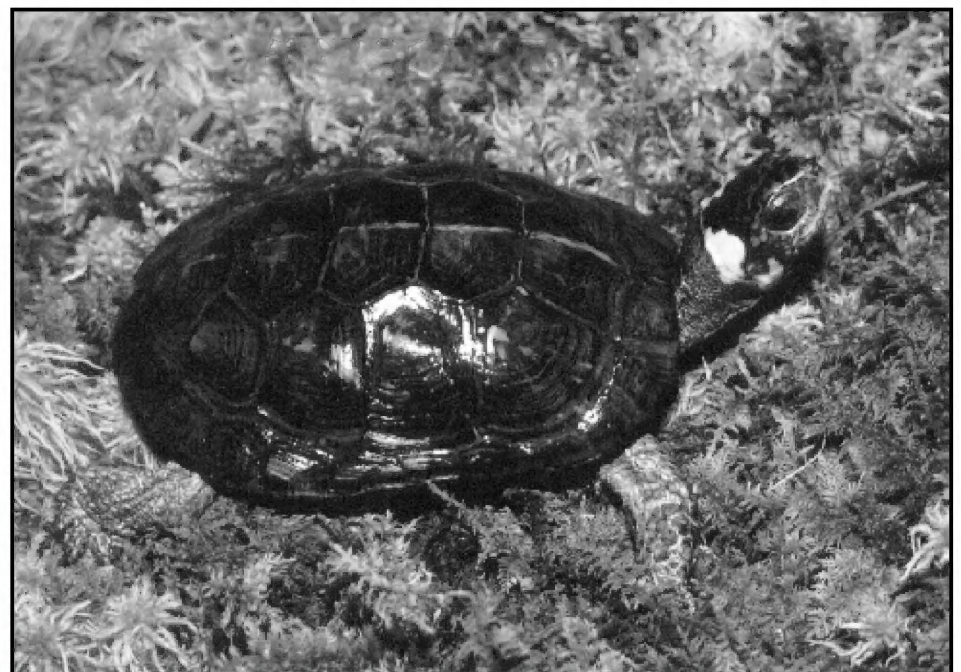
This barking treefrog (*Hyla gratiosa*) was part of a chorus photographed in Laurinburg Pond as a thunderstorm approached during our 1990 trip. Some of the barkers were plain green and others were spotted like this one.



The carpenter frog (*Rana virgatipes*) is a small, nondescript species related to the leopard frog. The name derives from its call, which sounds like a hammer repeatedly striking a nail.



Mabee's salamander (*Ambystoma mabeei*) is a small species of mole salamander, and thus is related to the tiger salamander. It is secretive and seldom seen, but we found specimens both in 1990 and 1998.



The bog turtle (*Clemmys muhlenbergii*) is related to the wood and spotted turtles. Its relict populations — it is the rarest turtle in the United States — and demand for the pet trade make it particularly vulnerable; therefore it is protected throughout its range. We accompanied Dennis Herman and Jim Green to monitor a small population of 46 marked individuals. Dennis found six turtles by probing in the muck with a stick; none of the rest of us found a single turtle.

Jerry and I set off through the longleaf pine flatwoods. The underbrush was controlled by periodic burning and areas of charred ground were frequently seen, so the ground between the trees was relatively open and easy to walk through. The pines were pole-straight. A number of them had two white bands of paint around the trunk. These trees contained red-cockaded woodpecker nests which were being monitored. The red-cockaded woodpecker is rare because it requires undisturbed stands of mature pine trees in which to nest, and those are fast disappearing. The birds drill a nest hole in the live tree, then periodically freshen the opening so that sap continually flows from the tree around the nest hole. The sap is sticky and irritating and is a very effective repellent for any snakes that might climb the tree looking for nestlings for dinner. In the gamelands there was little human debris like roofing tin or boards to turn looking for snakes. Rather we watched for them crossing roads, inspected bridges and ponds, and looked for dead trees with loose bark. It is well known that scarlet kings can be found under loose pine bark. The trick is to gently lift the bark up, like opening a book cover, so that it might be laid back down in its original position. Just ripping it off the tree or log destroys the habitat. Wildflowers abounded and birds were singing as we drove along.

Within an hour, Jerry and I were walking through some woods inspecting each stump and log. We had seen a couple of skinks, *Eumeces inexpectatus*, and a fence swift, *Sceloporus undulatus*. Jerry was 100 yards away in the middle of a recently burned patch when I heard his faint voice call, "Here's one!"

It could only mean one thing: scarlet king. Home run. Whatever else happened, our bias for this amazingly bright and beautiful, foot-long snake meant that this trip would be considered a success. It was under bark on a lone log in the middle of a wide, bare, recently burned area. I had not used the video camera before but soon found that its close up capability was impressive. I filled the frame with that tiny snake's front half. I took slides as well, as one can never have too many scarlet king shots. We bagged the snake to show the others, after Jerry noted the exact location on the GPS so we could later release it on the very log where it had been found.

Our excitement charged us with energy for the rest of the afternoon, but the scarlet king was to be our one good find. Now it was time to meet at Crappie Lake. We slowly realized that the unnamed roads on the map were tortuous rather than straight and met in irregular intersections—sometimes a cross-roads, sometimes in five or six or seven points. Turning to the GPS, we found that our location was too far from major roads and towns. The screen was a blank gray with a small arrow accurately showing our location to be in the middle of nowhere. The GPS offered only the most general help in the form of a nearby river. When we got too close to the river, we knew we had ventured too far north. The closer we got to where we thought Crappie Lake would be, and this was only by dead reckoning, the rougher and more impassible the roads became. Crappie Lake evolved into Crappy Lake. We were now an hour late. Finally, we picked up Mike on the Talk-about, just as Gery crossed an intersection half a mile in front

of us. The "major" road that passed the lake was impassible to all but Mike's Jeep, and the "lake" itself turned out to be no more than an almost dried up pond. With a little effort we finally got together, but it would have been difficult without the walkie-talkies.

Gery and Ralph had given up on the gamelands and found a nearby town, on the outskirts of which they located a mother lode of abandoned debris, mostly tin. Turning it, they found a subadult, opaque corn snake, and not one but *two* mole kings. Both were large, fat and robust, but one was as pale as the other was dark. Both had blotches about the same color as their background color, and neither could be called a beautiful snake. Still, they were "good snakes" and we were excited to see and photograph them. After we all enthused, Jerry brought out his scarlet king and our snake bias was affirmed, as the one tiny snake seemed to be worth more than the three bigger ones combined. The video cameras captured our enthusiasm over a great afternoon's work, along with Don's quiet complaint, "All Mike and I saw was an anole."

We spent some time taking video and slides of the four snakes. While filming the corn snake as it crawled along the ground, it suddenly turned towards a pine tree, lifted its head, and climbed straight up the trunk. These snakes are shaped like a loaf of bread on cross section (Conant, 1991, plate 28), sort of like an upside-down U with a straight line across the opening of the letter. The straight line is the belly, while the arch of the U is the top of the back. The corn snake wedged the sharp angle where its sides met the ventral scutes into nooks and crannies of the rough bark and went straight up the trunk without wrapping around it. When lifting the snake from the trunk, those angles stuck, so pulling it free felt a bit like opening a Velcro closure. The video captured this climbing skill in a way no still picture ever could. Here was an active demonstration of the need for sap around the opening of the woodpecker nests; it was obvious that a corn snake would have no trouble climbing 30 or 40 feet straight up the trunk of a pine tree. Another interesting observation was the comparison between the wild corn snake and the captive ones in my collection. I have two older captive-bred corn snakes, one 10 years old and the other 16 years old. Living the soft life in captivity has turned my snakes into couch potatoes—they are slightly plump and round on cross section from lack of exercise. By comparison, the wild caught snake was buff, ripped, just plain *muscular*. The difference between wild and captive was like the difference between a college athlete and a middle aged desk jockey. It made me conclude that we should provide these snakes with bigger cages in captivity, along with plenty of climbing opportunity.

After photographing them, we drove in a caravan to release the snakes and then on to our hotel for the night. First we stopped at the tin site to release the three big snakes. Poking around revealed a southeastern crowned snake and a black racer, *Coluber constrictor*, the first of 30-odd specimens of that species we would see alive on the road (AOR), DOR, and mostly under tin. We then used the GPS to find the scarlet king log and filmed it as it crawled back under the bark of its home. The group drove to Raeford and found our motel, along

with a horrid meal in a local greasy spoon. My experience on these trips is that the cuisine is never one of the drawing points. Not only was it *bad*, but Mike had to wait 45 minutes for his meal after the rest of us had been served.

That night we investigated Laurinburg Pond. This is one of the Carolina Bays which frequent the coastal plain. The bays are ephemeral ponds which often dry up late in the summer, hindering fish populations and fostering amphibian breeding. The bays all run in a northwest to southeast orientation and their origin remains a mystery. In 1990 we had the enjoyable experience of photographing calling barking tree frogs, *Hyla gratiosa*, here as a huge thunderstorm and spectacular lightning show approached in the distance. This year we arrived two weeks earlier and found the pond flooded. Only a few barkers were calling because of the early date, but their sheltering reeds were now in waist deep water and our rubber boots were only knee high. We settled on a roadside ditch and located calling little grass frogs, *Pseudacris ocularis*, and pine woods tree frogs, *Hyla femoralis*. The laser pointer was handy to point out a cryptic frog which had stopped calling. While scanning the surface of the water I saw a watersnake head briefly before it disappeared under the weeds. I slowly grabbed a big handful of weeds 6 inches behind the spot where I had seen the head and lifted it up. Turning it over, I had a hold of a banded watersnake, *Nerodia f. fasciata*. I passed the snake to Ralph so I could take videos, and soon saw in the viewfinder that the snake now had a hold of Ralph. On viewing the videos later, it was interesting to note the distracting roar of passing traffic in the background, a noise which we ignored and didn't notice while standing in the ditch due to familiarity.

The next day may be accounted for in brief summation. We woke to steady rain and 56 degrees. Mike and I spent the day discovering that the names of the roads in our new area had different names on the sign posts than those on Jerry's maps. The weather made it immaterial that we were lost most of the time, as we only saw a DOR frog in spite of stumbling on a very promising site with lots of tin. Still, Ralph and Jerry found two coachwhips under tin at different sites. The cold made them sluggish which in turn made photography easy, as these active snakes are normally a challenge to pose. After dark we headed for the Green Swamp near the coast. On the way to our hotel in Shallote, North Carolina, the group located a pond with calling southern cricket frogs, *Acris gryllus*, and carpenter frogs, *Rana virgatipes*. The calls of the latter sound like a carpenter hammering nails. The video cameras took amazingly sharp and well exposed images considering that the frogs were only illuminated by a flashlight, and recorded the din of the chorus in stereo.

It's always amusing for me to check into a shiny new motel while on a field trip. Invariably the other guests are normal. Maybe I'm just self-conscious, but I always feel like we stand out as the only group wearing herp tee shirts and rubber boots, while covered with varying amounts of sunburn, insect bites, scratches and mud. Still, the staff and other guests treated us well. We cleaned up nicely and blended in with the guests at the complimentary continental breakfast the next morning, with

the exception of our thematic tee shirts. The rain had abated and the sun made the day warmer. As we left there was a big snapping turtle, *Chelydra serpentina*, on the road right in front the motel, symbolic, we hoped, of the success the day would bring.

We were now in the Green Swamp of southeastern North Carolina. One of the unique features of the area is the proliferation of carnivorous plants. They evolved in response to the poor quality of the soil and use their insect prey to supplement the poor nutrition absorbed by their roots. This section of coastal plain is the only place in the world where Venus flytraps grow in the wild. In some places the ground is covered with a carpet of them. Each trap has three trigger hairs on each half of the trap. A moving insect has to trigger not one, but two hairs, or one hair twice in rapid succession, to spring the trap. Moreover, as the spinelike "teeth" on the edge of the trap touch, the plant pauses. Continued struggling by the captured insect causes the trap to completely close, with the "teeth" interdigitating. If there is no further movement, the trap opens again so that minimal energy is wasted when the plant is falsely triggered by an inanimate object. In addition to flytraps, several kinds of pitcher plants abound. These plants have vaselike chambers with narrow entryways and sweet nectar at the bottom to lure insect prey. The opening is guarded with downward sloping "hairs" which prevent the escape of any insects which enter. We also saw two kinds of sundew plants. These have specialized leaves covered with spinelike projections, each of which is tipped with a bead of glue-like sap. If an insect lands on the leaf, it sticks to the glue as the leaf rolls up around it and digests it.

I rode with Mike again and the three cars split up once more. We met for a picnic lunch in the middle of the swamp, again assisted by the Talkabouts, and returned to the motel before dinner. Most of what we saw was either crossing the road, under bridges we investigated, or associated with human debris on the periphery of the swamp. There was a profusion of small, "bad" snakes. Again, no snake is bad, but some are better than others. Still, we were less enthused with a brightly colored ringneck snake and another diminutive southeastern crowned snake. The latter is actually very interesting—it's rear-fanged and is known for eating centipedes. Crowned snakes are secretive and hard to find, and this was our second. We saw a large brown water snake, *Nerodia taxispilota*, basking over a stream near a bridge and a beautiful spotted turtle, *Clemmys guttata*, AOR. The later brought a profusion of bad puns, like "She's been *spotted*!" as well as a profusion of photos and video.

After lunch Mike and I saw three notable DORs. The first was a large cottonmouth which had recently been hit and was still moving. It was the same length as a "greenish" rat snake, *Elaphe obsoleta quadrivittata*, seen DOR soon after, but was significantly bulkier with a much larger head. The rat snakes here are considered yellow rat snakes, but look more like the "intergrade rat snake," *E. o. obsoleta* × *E. o. quadrivittata*, illustrated in Conant and Collins (1991). The actual zone of intergradation between these two species is a band farther north and west than where we were (Palmer and Braswell, 1995).

This one was dark green, almost black on the anterior half, fading to olive green on the rear half. It had four longitudinal stripes like a typical yellow rat snake, although these were hard to see against the dark background on the front half. The last DOR was a beautiful corn snake, as pretty as any captive-bred Okeetee phase I've ever seen. It hadn't been there when we passed by earlier in the day.

Gery, Ralph, and Don had better luck. They found a third mole kingsnake AOR, but this one was a gorgeous snake, with a reddish hue similar to a corn snake. It had a reddish brown background and rich maroon blotches. Gery left a big imprint in the muddy road with his knee as he dove to get the snake, the same injured knee that almost caused him to stay home from the trip. The excitement of the mole king negated any knee pain. During filming, the snake made peculiar sideways twitching motions with its head as an apparent defense in addition to the more typical striking and tail rattling. The group also found a large, four foot plus corn snake AOR, and snatched it off the road literally from under the tires of an oncoming truck. This snake wasn't as pretty as the DOR specimen, but it was large and robust. If the subadult we saw earlier was brawny, this one was positively bulging with muscles. It made my captives at home look flabby. The snake coiled in typical rat snake behavior, with multiple S-shaped anterior loops raised off the ground in preparation to strike, revealing the stark black and white checkerboard ventral pattern. This snake also climbed straight up the trunk of a tree while being filmed, demonstrating climbing to be a common behavior in corn snakes.

After dinner we visited Dean Ripa in Wilmington. Mike, as editor of the CHS *Bulletin*, had gotten to know Dean when he wrote a couple of papers for the *Bulletin* (Ripa, 1994; Ripa, 1997). Dean's specialty is bushmasters (*Lachesis* spp.). Bushmasters are Central and South American pit vipers which hold the distinction of being the largest New World venomous snake as well as the only New World viper that lays eggs instead of bearing live young (Campbell and Lamar, 1989). Adults reach 2.0 m (6.5 ft) in total length with large specimens exceeding 3.6 m (11.8 ft). There is one unsubstantiated report of an individual measuring 4.3 m (14 ft) in total length (Campbell and Lamar, 1989). Bushmasters have the reputation of acclimating poorly to captivity. In fact, Dean has earned no small notoriety as being the first to not only breed several taxa of bushmaster in captivity, but to produce them in numbers.

Until recently, bushmasters were considered to be a single species divided into four subspecies: *L. m. muta* and *L. m. rhombeata* from South America, and *L. m. stenophrys* and *L. m. melanocephala* from Central America. The four groups have geographic ranges which do not overlap, and both morphological and behavioral differences suggest that the Central American bushmasters are distinct from the South American taxa. Recent DNA studies confirmed those differences and the Central American forms were elevated to full specific status (Zamudio and Greene, 1997). Thus the bushmasters consist of the South American Bushmaster, *L. muta*, the Central American bushmaster, *L. stenophrys*, and the black-headed bushmaster, *L. melanocephala*. The data showed some populations of

the Amazonian *L. m. muta* to be more closely related to the Atlantic Forest bushmaster, *L. m. rhombeata*, than to other populations of *L. m. muta*; accordingly the Atlantic Forest form was not elevated and remains a subspecies. Dean contributed both data and material to aid that study. His collection includes all four forms of the bushmaster.

Dean's collection was stunning and his hospitality was most generous. He admitted six strangers into his house for the full, grand tour, and welcomed every question until we had our fill well after midnight. Adjectives cannot do his collection justice. The snakes were large, robust, and impressive, and their cages were huge, natural, and well lit. He used glass storm doors turned sideways as the fronts for his custom-built cages. The cages themselves measured approximately 7 by 4 by 4 feet high and were stacked two high. Two of the stacked cages were a full 14 by 4 by 4 feet high. Most cages housed two or three bushmasters. Each was lined with fine hardwood mulch and contained several weathered log retreats and green plants. Each cage was well illuminated by individual sets of fluorescent lights. The cages filled three rooms downstairs and overflowed into another room on the second floor. Afterwards we tried to count how many snakes we had seen and came up with a minimum of 17 adult bushmasters. Dean collected the original specimens from various Latin American countries back when there were fewer legal restrictions, and some of his snakes were over 20 years old. Other snakes were raised from those born in captivity. Some juveniles were on hand, as well as a pair of *Bothrops leucurus*, a green mamba, *Dendroaspis viridis*, he had collected years earlier in Africa, and even a few green tree pythons, *Morelia viridis*. The latter are normally considered among the most beautiful of all snakes, but these looked like garter snakes in comparison to the rest of the collection.

An adult bushmaster is an impressive animal. A room full of them is breathtaking. These snakes resembled boa constrictors in size and girth. Most of Dean's were in the 7-foot range and probably weighed more than 20 pounds. They were brightly colored with backgrounds of light brown to lemon yellow and contrasting dorsal blotches of dark brown to black. They exhibited behavior that would be interpreted as intelligent if it were done by a human. The snakes were very alert and responsive to our presence. They crawled about with their heads a foot off the ground, following our every movement and flinching at every camera flash. They flicked their long, deeply forked tongues rapidly like a garter snake, not slowly like a rattlesnake. Dean was quick to point out that their tongues are bright pink in color, not black as erroneously reported (Campbell and Lamar, 1989). He surmised that perhaps those authors had examined dead specimens. Bushmasters also have a single, long, laterally compressed spine on the tip of the tail, as long as 4 to 6 of the preceding subcaudal scales. Natives incorrectly think the spine is venomous, as well as the tongue, and Dean reported that native collectors often brought in snakes from which both the tongue and tail spine had been severed, but not the 35 mm (1.37 in) long fangs. *Lachesis muta* is perhaps my favorite scientific name for a reptile. *Lachesis* is one of the three Fates of Greek mythology. One Fate was said to weave each person's thread of

life, and another to end that life by cutting the thread. Lachesis was the Fate who chose the length of each strand, metaphorically the length of each life. *Muta* means “mute” and refers to the tail spine. Being single it produces no noise when shaken; thus the bushmaster is like a mute rattlesnake.

Dean fed a couple of the bushmasters while we were there. He dangled a prekilled rat in front of them using a long pair of tongs. The snake struck the rat and held on, holding the rat elevated off the ground. Dean assured us this was their normal feeding strategy. With clamped jaws it was interesting to see a fold of skin that extended from below and behind the eye to a point below and in front of the heat-sensing pit. As the snake gripped its prey, the fold of skin was pushed up to partially cover and shield both the eye and heat pit. This would be an obvious advantage for a snake that held onto its prey until the venom had subdued it. The other amazing sight was the process of swallowing, during which the snake walked the rat down its throat with alternate movements of the left and right jaws. What was unique, however, was how the 35 mm fangs extended and gripped the prey, first left, then right, and so on, as the swallowing progressed. The fangs looked like toothpicks, or fingers, the way they were manipulated to move the rat. It was both fascinating and horrifying, imagining those long fangs sinking into your hand.

Dean was generous in allowing us to shoot as many slides and as much video as we wanted. He was a storehouse of knowledge as we peppered him with questions. I have to confess that I thought visiting a private collection would be marginally interesting, but it proved to be one of the highlights of our trip.

Our next destination was across the border in South Carolina. We drove through that cultural desert called Myrtle Beach, land of miniature golf, shell shops, dinner theaters and “gentlemen’s clubs,” to historic Georgetown. This was our base as we explored the area around the Francis Marion National Forest. We wondered who the forest was named for until a sign for “Swamp Fox Tours” opened a long forgotten mental drawer containing facts concerning that Revolutionary War hero. Francis Marion *was* the Swamp Fox of lore. Jerry had a contact to grant us access to a private farm, which proved mostly barren of herps except for two notable ones. Under a woodpile we found two Mabee’s salamanders, *Ambystoma mabeei*, (“Maybe,” we said in unison, until Jerry later confirmed our identification from the video), and a large copperhead perfectly coiled under a different pile of boards. The copperhead sat patiently while we removed sticks, leaves and debris from its back using snake tongs to make for better photography. It didn’t move while we checked under all the other boards in the pile. It allowed everyone present to take slides and video, including closeup shots of its head, and even waited for Jerry to cross a big field. “What are y’all doing under that big tree over there?” floated over the Talkabout before he decided the trek was worthwhile. The snake finally lost patience, so we hooked it away while we carefully reconstructed its home, then directed it safely back under the pile of boards.

We met Jerry’s friend, Eric Stine, who would guide us through the area around the Francis Marion National Forest.

He had collected both a small eastern kingsnake and a shiny, brightly colored mud snake, *Farancia abacura*, near his camp site in the National Forest for us to photograph. It was late afternoon when Eric led us to Hell Hole, a low swamp within the National Forest. It was still sunny and warm, so we stopped to look under bark in a stand of dead pine trees. Mike returned to the car with the frustrating tale of lifting a piece of bark on a vertical trunk, only to see a small red, white, and black snake fall from under it to the ground. As it landed, it simultaneously burrowed into the loose bark on the ground around the trunk, and disappeared just that fast. Mike looked thoroughly but it was already gone. Still, it was a scarlet king: home run number two.

Eric led us along a dirt road with a flooded roadside ditch, claiming this was the haunt of cottonmouths. “When you spot one,” he warned, “you can’t waste time; you have to get after them.” Sure enough, we were two car lengths behind his truck when the brake lights flashed, his door opened, and Eric flew out as if shot from a cannon. Tongs in hand, he was instantly crotch deep in the water with a 3-foot-long cottonmouth securely in the grasp of his tongs. We were impressed. This guy put the snake before personal comfort.

The next day a barred owl watched from a nearby tree as we released the king and mud snakes Eric had saved for us. The herps proved to be few and far between within the forest, and so the group began to concentrate on human habitat on its periphery — abandoned shacks, tumbledown barns, and piles of trash were known to be crawling with snakes. One huge eastern king was found crossing a dirt road. Over five feet long and thickly muscular, this brute had white chainlike marks at least half an inch wide. Gery and Ralph stumbled on a small farm which was an abandoned hunting-dog kennel. One doghouse was upside down, resting on its shingled roof. Gery lifted the doghouse and another scarlet king dropped out of the shingles onto the ground. Home run number three. It was opaque, but gorgeous, and Gery now swears that doghouses yield more snakes than do dead pine logs. He was quoted as saying he looks for “Beware of Dog” signs as evidence that scarlet kings live there. They also found two more eastern kings; Mike and Don found a fifth. We were beginning to appreciate the abundance of kingsnakes seen on this trip. Surely they were the most common “good” snake.

We enjoyed one final adventure before returning north of the Mason-Dixon line. Jerry brought us to the Schiele Museum of Natural History in Gastonia, North Carolina, where we met Jim Green and Dennis Herman. They are cooperating in a project to monitor populations of the endangered bog turtle, *Clemmys muhlenbergii*. These four-inch turtles with bright orange blotches on their neck live in spring-fed bogs. At one site near Gastonia Dennis had marked 46 individual turtles, many of which had been recaptured over the years. Jim and Dennis were visiting the site to look for turtles and to record weights and measurements on any they found. We were to accompany them. Our tools were Spartan: rubber boots and a pole to use for probing in the mud. The turtles bask on mats of grass in good weather, and remain below the bog surface otherwise. Once disturbed, they quickly borrow deeper into

the bog. The recommended technique was to walk through the bog, probing with the pole. If a solid “thunk” was heard, the pole had bumped the shell of a bog turtle, and the prober simply groped in the mud for it with his bare hand. Dennis encouraged us by saying he had only heard of one man who felt a turtle, reached down, and was severely bitten when it proved that he had probed the head of a large snapping turtle rather than a tiny bog turtle.

The final score was Dennis, 6; rest of the team, 0. It was frustrating, but obviously there was a search image involved and a certain feel to the pole, because he found so many and no one else found a single turtle. All six were recaptures of previously marked turtles. Still, it was thrilling to see the rarest turtle in the United States in its natural habitat.

Gery, Ralph and I changed from boots to street shoes, wiped the mud off our pants as best as possible, and an hour later were boarding our flight home. Mike and Don spent a few more days hunting and turned up a couple of copperheads, a large red-bellied water snake, *Nerodia erythrogaster*, and one final scarlet king. It was home run number four.

I was interested to compare a list of the species of herps seen on three trips to the coastal plain of North Carolina in 1979, 1990 and 1998 (Table 1). I should note that we did look for herps briefly near Raleigh in 1990 and near Gastonia in 1998. Thus the list includes species found in the Piedmont but not the coastal plain, like the American toad, northern dusky salamander, bog turtle, brown snake and northern watersnake.

The most recent trip differed in that it was a couple of weeks earlier in the year than the other two, and this may have affected which species were active. The first trip produced fewer species because only Jerry and I participated. On the subsequent visits we had three cars and six to eight people, and thus covered more ground in the same length of time. In retrospect I wish I had recorded the numbers of each species seen in addition to the list I kept. It is interesting to note that numbers of certain species differed significantly between each of the three trips. Black racers are not only common but their habits of frequenting human habitation and being active during daylight hours made them the most frequently encountered snake on all three trips. With other species, weather patterns and search techniques influenced which ones were seen on a given trip. During the first trip in 1979 we found a number of eastern hognose snakes, *Heterodon platirhinos*, and a single scarlet king. The 1990 trip was notable for the preponderance of legless lizards, *Ophisaurus ventralis*. We found a single scarlet king and three eastern kings, but were frustrated by the fact that all the other “good” snakes found were DOR. These included corn snakes, mole kings, a coachwhip, a canebrake rattlesnake, and even a pine snake. The current trip was remarkable because we saw so many “good” snakes alive, including two corn snakes. But our greatest success was with *Lampropeltis*: we saw more eastern kingsnakes (5), more scarlet kingsnakes (4), and the first mole kingsnakes—and three of those!—of any of our visits. We advanced our use of technology and saw a bunch of bushmasters, but the highlight of the trip was hitting the kingsnake jackpot.

Table 1. Comparison of three herping trips to southeastern North Carolina.

Scientific name	Common name	4-5/79	4-5/90	4/98
<i>Siren lacertina</i>	Greater siren			
<i>Siren intermedia</i>	Lesser siren			
<i>Amphiuma means</i>	Two-toed amphiuma			
<i>Necturus punctatus</i>	Dwarf waterdog			
<i>Notophthalmus viridescens dorsalis</i>	Broken-striped newt		X	
<i>Ambystoma mabeei</i>	Mabee’s salamander		X	X
<i>Ambystoma tigrinum</i>	Tiger salamander			
<i>Ambystoma opacum</i>	Marbled salamander		X	
<i>Desmognathus auriculatus</i>	Southern dusky salamander		X	
<i>Desmognathus fuscus</i>	Northern dusky salamander			X
<i>Pseudotriton montanus</i>	Eastern mud salamander			
<i>Stereocheilus marginatus</i>	Many-lined salamander		X	
<i>Plethodon chlorobryonis</i>	Atlantic Coast slimy salamander	X	X	X
<i>Plethodon cinereus</i>	Northern redback salamander			
<i>Eurycea cirrigera</i>	Southern two-lined salamander			
<i>Eurycea longicauda guttolineata</i>	Three-lined salamander			
<i>Eurycea quadridigitata</i>	Dwarf salamander			

Table 1. (cont'd)

Scientific name	Common name	4-5/79	4-5/90	4/98
<i>Scaphiopus holbrookii</i>	Eastern spadefoot toad		X	
<i>Gastrophryne carolinensis</i>	Eastern narrowmouth toad		X	X
<i>Bufo americanus</i>	American toad		X	
<i>Bufo terrestris</i>	Southern toad		X	X
<i>Bufo woodhousii fowleri</i>	Fowler's toad	X	X	
<i>Bufo quercicus</i>	Oak toad	X		
<i>Hyla cinerea</i>	Green treefrog		X	D
<i>Hyla femoralis</i>	Pine woods treefrog	X	X	X
<i>Hyla gratiosa</i>	Barking treefrog		X	H
<i>Hyla squirella</i>	Squirrel treefrog		X	
<i>Hyla chrysoscelis</i>	Cope's gray treefrog		X	H
<i>Pseudacris triseriata feriarum</i>	Upland chorus frog			
<i>Pseudacris crucifer</i>	Spring peeper			X
<i>Pseudacris brimleyi</i>	Brimley's chorus frog			
<i>Pseudacris nigrita</i>	Southern chorus frog			
<i>Pseudacris ocularis</i>	Little grass frog			X
<i>Pseudacris ornata</i>	Ornate chorus frog			
<i>Acris gryllus gryllus</i>	Southern cricket frog	X	X	X
<i>Rana heckscheri</i>	River frog			
<i>Rana virgatipes</i>	Carpenter frog		X	X
<i>Rana clamitans clamitans</i>	Bronze frog	X	X	X
<i>Rana catesbeiana</i>	Bullfrog		X	X
<i>Rana utricularia</i>	Southern leopard frog		X	X
<i>Rana capito capito</i>	Carolina gopher frog			
<i>Rana palustris</i>	Pickerel frog		X	
<i>Alligator mississippiensis</i>	American alligator		X	
<i>Chelydra serpentina</i>	Common snapping turtle		X	X
<i>Sternotherus odoratus</i>	Common musk turtle	X	X	
<i>Kinosternon subrubrum subrubrum</i>	Eastern mud turtle		X	X
<i>Malaclemys terrapin centrata</i>	Carolina diamondback terrapin		X	
<i>Deirochelys reticularia reticularia</i>	Eastern chicken turtle			
<i>Clemmys guttata</i>	Spotted turtle		X	X
<i>Clemmys muhlenbergii</i>	Bog turtle			X
<i>Pseudemys floridana</i>	Florida cooter		X	
<i>Pseudemys concinna</i>	Eastern river cooter			
<i>Trachemys scripta scripta</i>	Yellowbelly slider			X
<i>Terrapene carolina carolina</i>	Eastern box turtle	X	X	X
<i>Apalone spinifera aspera</i>	Gulf Coast spiny softshell			

Table 1. (cont'd)

Scientific name	Common name	4-5/79	4-5/90	4/98
<i>Anolis carolinensis</i>	Green anole	X	X	X
<i>Sceloporus undulatus hyacinthinus</i>	Northern fence lizard	X	X	X
<i>Scincella lateralis</i>	Ground skink	X	X	X
<i>Eumeces fasciatus</i>	Five-lined skink	X	X	X
<i>Eumeces laticeps</i>	Broadhead skink	X	X	X
<i>Eumeces inexpectatus</i>	Southeastern five-lined skink	X	X	X
<i>Cnemidophorus sexlineatus sexlineatus</i>	Six-lined racerunner	X	X	X
<i>Ophisaurus ventralis</i>	Eastern glass lizard		X	
<i>Ophisaurus mimicus</i>	Mimic glass lizard			
<i>Ophisaurus attenuatus longicaudus</i>	Eastern slender glass lizard		X	
<i>Nerodia fasciata fasciata</i>	Banded water snake		X	X
<i>Nerodia erythrogaster erythrogaster</i>	Redbelly water snake	X	X	X
<i>Nerodia rhombifer</i>	Diamondback water snake			
<i>Nerodia taxispilota</i>	Brown water snake	X	X	X
<i>Nerodia sipedon sipedon</i>	Northern water snake			D
<i>Regina rigida</i>	Glossy crayfish snake			
<i>Seminatrix pygaea paludis</i>	Carolina swamp snake			
<i>Thamnophis sirtalis sirtalis</i>	Eastern garter snake			
<i>Thamnophis sauritus sauritus</i>	Eastern ribbon snake		X	X
<i>Rhadinaea flavilata</i>	Pine woods snake	X	X	
<i>Storeria dekayi</i>	Brown snake			X
<i>Storeria occipitomaculata</i>	Redbelly snake	X	X	X
<i>Virginia striatula</i>	Rough earth snake	X		
<i>Virginia valeriae</i>	Smooth earth snake		X	X
<i>Diadophis punctatus punctatus</i>	Southern ringneck snake	X	X	X
<i>Heterodon simus</i>	Southern hognose snake			
<i>Heterodon platirhinos</i>	Eastern hognose snake	X	X	
<i>Carphophis amoenus amoenus</i>	Eastern worm snake	X	X	X
<i>Cemophora coccinea copei</i>	Northern scarlet snake			
<i>Opheodrys aestivus</i>	Rough green snake		X	D
<i>Farancia erythrogramma</i>	Rainbow snake			
<i>Farancia abacura abacura</i>	Eastern mud snake		D	X
<i>Coluber constrictor constrictor</i>	Northern black racer	X	X	X
<i>Masticophis flagellum flagellum</i>	Eastern coachwhip		D	X
<i>Pituophis melanoleucus melanoleucus</i>	Northern pine snake		D	
<i>Elaphe obsoleta</i>	Eastern rat snake		X	X
<i>Elaphe guttata guttata</i>	Corn snake	D	D	X
<i>Lampropeltis triangulum elapsoides</i>	Scarlet kingsnake	X	X	X
<i>Lampropeltis calligaster rhombomaculata</i>	Mole kingsnake	D	D	X

Table 1. (cont'd)

Scientific name	Common name	4-5/79	4-5/90	4/98
<i>Lampropeltis getula getula</i>	Eastern kingsnake		X	X
<i>Tantilla coronata</i>	Southeastern crowned snake		X	X
<i>Agkistrodon contortrix</i>	Copperhead		X	X
<i>Agkistrodon piscivorus piscivorus</i>	Eastern cottonmouth		X	X
<i>Micrurus fulvius</i>	Eastern coral snake			
<i>Sistrurus miliarius miliarius</i>	Carolina pigmy rattlesnake			
<i>Crotalus horridus</i>	Timber rattlesnake	X	D	
<i>Crotalus adamanteus</i>	Eastern diamondback rattlesnake			
Total Species		28	63	51

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Errata: Keys to Understanding the Bushmasters (Genus *Lachesis* Daudin, 1803)

Dean Ripa

Please note the following corrections to “Keys to Understanding the Bushmasters (Genus *Lachesis* Daudin, 1803)” by Dean Ripa, which appeared in the *Bulletin of the Chicago Herpetological Society* 34(3):45-92, 1999.

Page 51: footnote, line 1, should read “Describing the Darien bushmaster as a species distinct from *L. stenophrys*. . . .”

Page 69: column 1, line 29, reference to “Ripa (1997).” The following citation was left out of the Literature Cited:
Ripa, D. 1997. Range extension for *Bothrops leucurus*. Bull. Chicago Herp. Soc. 32(2):25-26.

Page 71: column 1, line 14, “irrigated” should read “infiltrated.”

Page 71: column 1, line 29, “were” should read “where.”

Page 80: Table 5, under “Ecogeography and rainfall, Darien bushmaster,” the following sentence was left out: “In the Choco region, rainfall may reach 5000 mm.” Footnote 9, citing Myers et al. (1978), was intended to apply to this sentence.

Page 89: reference to “Hardy (1998)” in the last paragraph of footnote 5 to Table 8 should read “Hardy and Haad (1998).”

The Enigma of Sex Determination in Reptiles

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In August of 1996 I was presented with the task of describing gonad formation in the spiny softshell turtle, (*Apalone spinifera*). Ostensibly, this seemed like a job that would have little interest, but I soon learned that it would have great significance to scientists interested in sex determination. The reason? Softshell turtles are one of the few turtles currently known to have genetic sex determination (Table 1).

Most turtles actually have what is known as temperature-dependent sex determination (TSD), a condition in which the sexual outcome of the hatchlings is determined by the ambient incubation temperature. Among reptiles, three types of TSD are known: designated Pattern Ia, Pattern Ib and Pattern II. In Pattern Ia, high temperatures yield a high frequency of females. Pattern Ib reptiles yield males at high temperatures. And Pattern II species yield females at high and low temperatures, with males emerging from intermediate temperatures. It is probable that the latter pattern of TSD is the most primitive. Note that the Kinosternidae, Carettochelyidae and Trionychidae are three families of turtles that are closely related, yet display widely varying forms of sex determination (Gaffney, 1984). The ineluctable question is why?

Charnov and Bull (1977) proposed an explanation for the existence of TSD. If a differential advantage exists between males and females in an environment for resource use, predator avoidance or mate acquisition, then it pays for TSD to exist. In this way, a cue from the environment (i.e., temperature) can be employed to determine the sex of the developing embryos to their best advantage. Because it pays for these embryos to get as much environmental information as possible before irreversibly advancing towards the formation of an ovary or testis, it is to their best advantage to delay sexual differentiation as much as possible before hatching. This is precisely what happens in species with TSD.

In discussing embryological development in turtles, scientists have developed a system in which 26 stages of development are utilized (Yntema, 1968). Stage 1 is about the time of egg laying and stage 26 is hatching. Gonads start to develop into an ovary or testis between stages 18 and 20 in TSD turtle species. However, changes in temperature can reverse the path of sexual differentiation after it has begun (Table 2). Ultimately, temperature can delay sexual differentiation in TSD turtle species until stage 22 in some cases.

Although many aspects of the phenomenon are not understood, the theory above gives a basic framework for one to consider TSD. But what about the few known cases in which genetic sex determination (GSD) exists? Charnov and Bull (1977) hypothesized that GSD would arise from species with

TSD if there was not an advantage to one sex in the environment. GSD appears to have arisen independently four to six times in turtles (Ewert and Nelson, 1991). But if it does not pay for these turtles to delay sexual differentiation, would it actually occur earlier in embryonic development? To my surprise, none of the scientists studying this phenomenon in

Table 1. Sex determination in reptiles.

Genetic Sex Determination (GSD)
Snakes
Most lizards
Some turtles, including:
Subfamily Staurotypinae (Kinosternidae)
<i>Siebenrockiella crassicollis</i> (Batiguridae)
<i>Chelodina longicollis</i> (Chelidae)
<i>Emydura signata</i> (Chelidae)
<i>Clemmys insculpta</i> (Emydidae)
<i>Apalone mutica</i> (Trionychidae)
<i>Apalone spinifera</i> † (Trionychidae)
Temperature-dependent Sex Determination (TSD)
Pattern Ia:
Most Bataguridae
Most Emydidae
Cheloniidae
Carettochelyidae
Dermochelyidae
Pattern Ib:
Alligators
Some lizards
Pattern II:
Some Bataguridae
Kinosternidae, except Staurotypinae
Pelomedusidae
Chelydridae

† This species is the focus of this study.

* Current mailing address: 108 Fordham Drive, Buffalo, NY 14216.

Table 2. Sexual differentiation.

Genus	Pattern	Temperature-sensitive stages [†]
<i>Graptemys</i>	Ia	16–22
<i>Chrysemys</i>	Ia	16–22
<i>Emys</i>	Ia	16–22
<i>Trachemys</i>	Ia	15–20
<i>Caretta</i>	Ia	12–22
<i>Chelydra</i>	II	14–19

[†] Changing the temperature at these stages can reverse the path of sexual differentiation from male to female or vice versa.

turtles had addressed this question in the 20-year history of the research.

Since the spiny softshell turtle, (*Apalone spinifera*) has GSD and is relatively common in Louisiana, I decided to investigate this species to determine at what stage sexual differentiation occurs. I hypothesized that sexual differentiation would occur earlier than in TSD species since *Apalone* has no adaptive advantage to delaying it. In order to do this study, I would have to obtain a couple hundred eggs, sacrifice embryos at various stages of development, make slides of the gonads to look for signs of sexual differentiation, and compare what I found to a recent study of sexual differentiation in the emydid *Trachemys scripta* (Wibbels et al., 1991).

The first task of the experiment, involving egg collection, was horribly unsuccessful. For months in the spring and summer of 1997 I searched for softshell turtle nests at Black Bayou Lake National Wildlife Reserve near Monroe, Louisiana. It was easy to spot the large disturbed areas of gravel or sand where females had dug nests, but in almost every case predators such as racoons, crows or fire ants destroyed the

eggs before I could find them. I turned to Jesse Evans, a turtle farmer in Wildsville, Louisiana, to obtain more eggs. He graciously donated 180 eggs to the research.

The eggs were randomly divided and put into incubators, one set for 31°C and the other for 26°C. This was to ensure that *Apalone spinifera* did indeed have GSD, and that temperature would have no effect on sex determination of the embryos. This fact was confirmed by the conclusion of the experiment.

I started sacrificing the embryos at stage 11 of development, and all went smoothly for a while. However, the older the embryos became, the harder it was to compare them to Yntema's (1968) staging criteria for the common snapping turtle, (*Chelydra serpentina*). In addition, a more recent staging scheme for painted turtles (*Chrysemys picta*) confused things by using only 23 stages of development (Mahmoud et al., 1973). By stage 24 (see Figure 1), none of the snapping turtle criteria could be used with my softshell embryos, and it became apparent that I would need to make my own staging criteria for *Apalone spinifera* if I were to proceed with the experiment. I spent months meticulously developing a staging methodology and discovered that some tiny details could distinguish softshell and snapping turtle embryos as early as stage 13!

When the staging problem was finally resolved in early 1998, I was able to extract gonads from the embryos and prepare histological slides. Germ cells, changes in the cortex structure, and Müllerian duct development showed whether the gonad was developing into an ovary or testis (Figure 2). The majority of the gonads had sexually differentiated by stage 19, exactly when such differentiation was occurring in TSD species. Superficially, there appeared to be no difference in the timing of gonadal differentiation between *Apalone spinifera* and

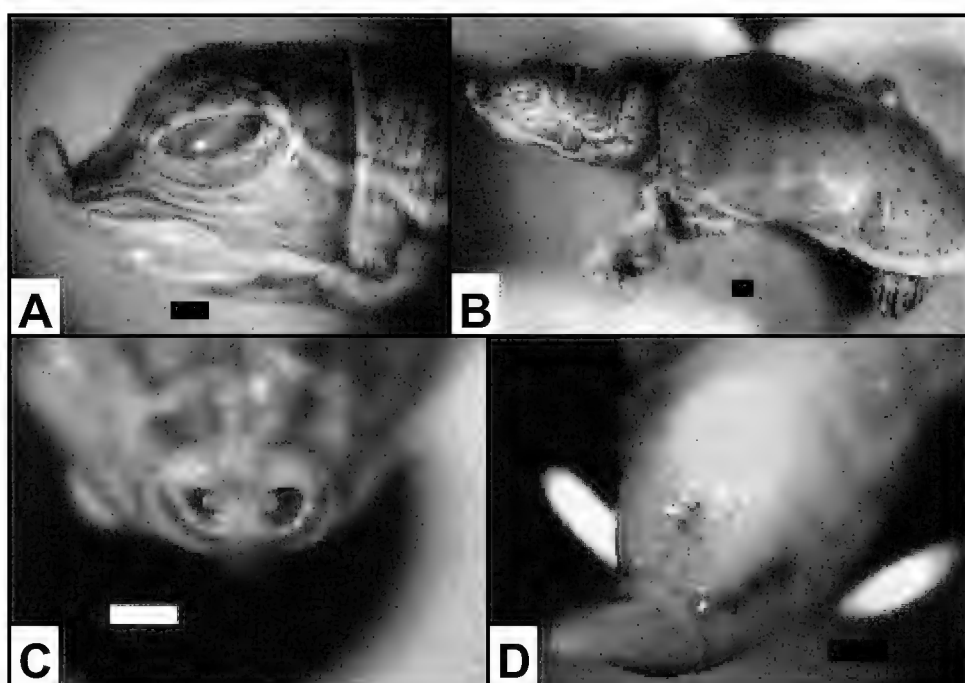


Figure 1. A. Lateral view of the head of a stage 24 embryo. Scale bar = 1 mm. B. Lateral view of the body of a stage 24 embryo. Scale bar = 2 mm. C. Narial cavity of a stage 24 embryo. The narial cavities are open revealing two tubercles that are oval shaped and project laterally a distance greater than the radius of the narial cavity. Scale bar = 0.5 mm. D. Ventral view of the vent of a stage 24 embryo. Scale bar = 1 mm.

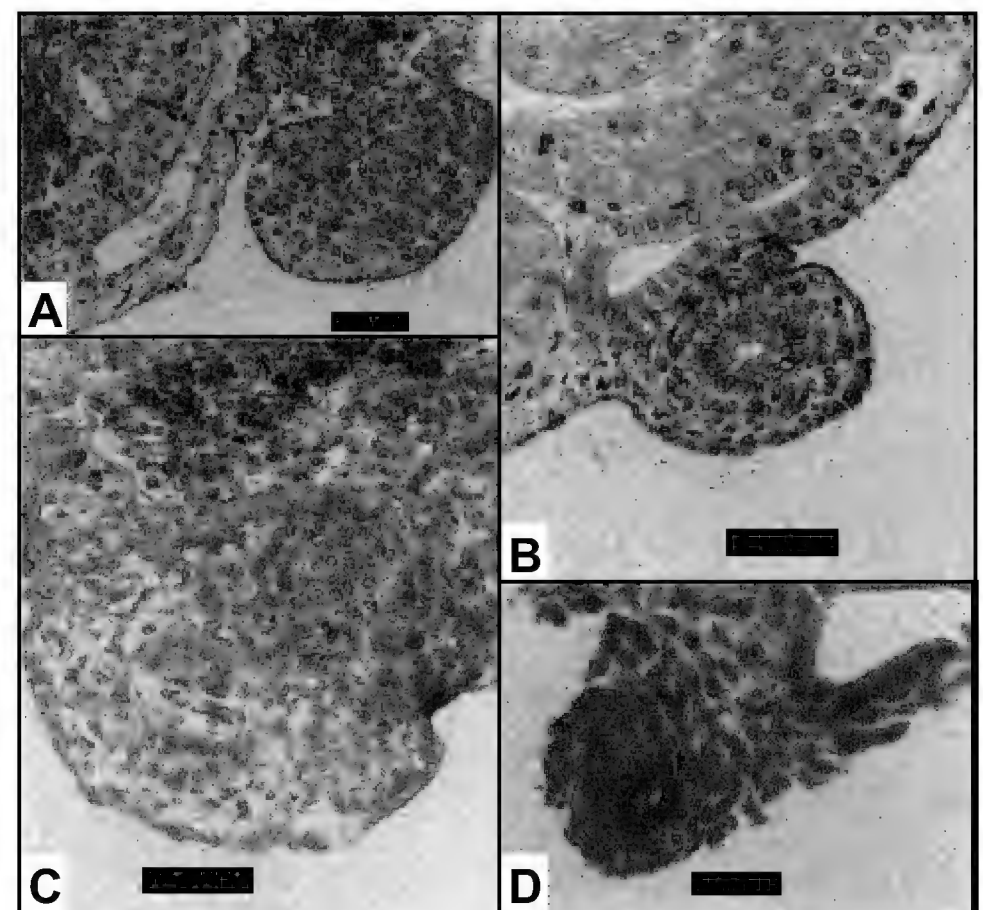


Figure 2. A. Stage 20 female gonad. Scale bar = 50 μ m. B. Stage 20 female paramesonephric duct. Note the duct of this individual rivals the size of the gonad (A) taken from the same specimen. Scale bar = 50 μ m. C. Stage 20 male gonad. Note the large spaces now present. The sex cords are distinct. Scale bar = 50 μ m. D. Stage 20 male paramesonephric duct. This individual shows a degenerated duct, but most specimens will not display the structure at all. Scale bar = 25 μ m.

TSD turtle species.

However, I did discover something intriguing about the Müllerian ducts. These ducts eventually form the oviducts in sexually mature females, and in males they degenerate as soon as the testes begin to develop. Apparently, some chemical produced by functioning testes breaks down the duct in males. In males of *A. spinifera*, the duct is first seen at stage 16, degenerates at stage 20, and then becomes undetectable by stage 21.

Although other turtles do experience degeneration of Müllerian ducts in males, very few of them degenerate to the point of being undetectable (Fox, 1977; Risley, 1933). However in a study of *Carettochelys insculpta*, a turtle species closely related to the trionychids, it was found that some males may have no recognizable Müllerian duct by hatching (Webb et al., 1986). The complete disappearance of this duct might be a useful tool for future systematics work.

But what were the veritable consequences of the finding that *Apalone spinifera* differentiates sexually by stage 19? Although this chronology is synchronous with TSD turtle species, the fact that sexual differentiation in softshells is irreversible changes the interpretation of the finding. Since TSD species can reverse their path of sexual differentiation up to three stages later, it appears that *A. spinifera* has a different agenda. This study suggests that *A. spinifera* is irreversibly sexually

differentiating earlier than TSD species.

What adaptive significance does this have? I propose that GSD species of turtles are trying to reach sexual maturity as soon as possible in order to maximize their reproductive fitness over their lifetime. Although further study is needed to confirm this theory, anecdotal observations of *A. spinifera* suggest that males are reaching sexual maturity much earlier than TSD turtle species (Dr. J. L. Carr, pers. com.; Webb, 1962; Graham, 1991). Scientists are still far from understanding the phenomenon of sex determination in reptiles since less than 10% of known reptiles have been studied with regard to their mode of sex determination (Ewert and Nelson, 1991). However, this study has brought us one step closer to solving the puzzle and shows just how intriguing this aspect of reptilian biology really is.

Acknowledgments

Dr. John L. Carr guided me in every step of this project from theoretical conceptualization to refinement of the thesis transcript, and I owe him a tremendous debt of gratitude. Drs. John Knesel, Neil Douglas, Frank Pezold and Mike Ewert assisted me in several aspects of this study. I am also grateful for the efforts of Dennis Bell, Martha Ann Messinger, George Patton and Paul Smith. This work was supported by a Grant-in-Aid-of-Research from Sigma Xi and a Grant-in-Herpetology from the Chicago Herpetological Society.

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HerPET-POURRI

by Ellin Beltz

Still in committee

Thanks to everyone who wrote, called, screamed, yelled, E-mailed, quietly worked behind the scenes, actively lobbied—it seems as though the attempt to delist the state-threatened eastern massasauga rattlesnake (*Sistrurus catenatus catenatus*) is not going to happen. The same bill number (HB2243) may be used for an amended bill, which does not include delisting the snake. What a sad tale. This being a highly politicized state, I urge you to read the whole story in *Chicago Tribune* [March 8, 1999, from Ray Boldt] and realize that the bill is linked to a downstate real estate developer who is a “politically connected river boat casino co-owner and president of a local horse racing track.” The legislator who sponsored the original bill said, “I don’t want to wipe the snake out; we are not going to end the species. In my area, this is a joke. The snake is rather plentiful down here.” The developer said that he didn’t know there was a snake problem and never lobbied for or against the species. The local mayor blames the problem on “environmentalists.” For the past 20 years, the community around Lake Carlyle has been trying to develop something to bring in the tourist dollars to their otherwise quite ordinary downstate Illinois dammed lake. It was the federal government that built the dam that made the lake that cost the community its natural canyons with their hunting/fishing tourism attraction. For the latest proposed lodge development, the snake was not originally raised as an issue—there were other issues like human fecal material and groundwater contamination. Nevertheless, the snake was blamed (shall we call this “Adam-syndrome”?) and the bill was written and released. Illinois got worldwide media coverage. Several herpetologists E-mailed the world; websites were set up and linked. The legislators got buried under calls, faxes, E-mails, visits, lobbyists (thank you Shedd Aquarium and Brookfield Zoo!) and newsprint. The bill has not been called, yet—even though it was going to be “rushed through” for a vote two days after anybody heard about it. I love E-mail! To be included in further efforts of this type, please E-mail me your address <ebeltz@ripco.com>. Congratulations to everyone and especially to the snake which is still state listed and should be federally listed, too. [Editor’s note: the amended version of HB2243, which no longer removes any species from the protected list, has now been passed in the house and is awaiting action in the senate. This amended version is supported by the Illinois Department of Natural Resources although some environmental groups still have reservations about it].

ReptileFest—May 1 and 2

The continuing construction at Northeastern Illinois University has forced ReptileFest to slither into the Physical Education Building instead of Alumni Hall this year. I think people will like the P.E. space better. Even if it is a little farther to walk from the parking lot, the way is beautifully native landscaped through an oak savanna. Watch for our local garter snakes along the way! You must contact the committee in order to volunteer or show an animal. Or just come and see everybody else’s critters and let Don Wheeler, Kim Smith or myself

tattoo you! They’ll be there both days—I’ll be there Sunday. Buy some tchotchkes from John Schoenfelder. Pet Bubba. Have your photo taken with the giant snake. Borrow a child or take your own. Please do not feed the animals, however, they have special diets. Pet the turtles. Watch the giant iguana habitat dominance games and head bobbing. Fun for all! See you there! Call Lori King-Nava (773) 477-3645 or Gary Fogel (773) 935-6938 for more information.

Don’t drink the water

“A new study suggests that atrazine—the nation’s most popular weed killer—may be partly responsible for the abnormal hormone levels and undersized male genitals found in some Florida alligators. . . . Computerized wind models show that large amounts of atrazine are wafting from sugar fields and falling or raining into four lakes north of Orlando. Those are the same four lakes where [researchers] . . . have found sexually altered alligators. . . . [A vice president for one sugar company said,] “He’s jumping to conclusions. . . .” Atrazine’s Switzerland based manufacturer, Novartis Crop Protection, has shown that any amount of the chemical falling with rain would be far too diluted to harm wildlife, . . . [according to] the company’s environmental products manager.” [Leesburg, FL *Daily Commercial*, January 3, 1999, from Bill Burnett]

Arroyo toad receives active protection

Once a common hopper in southern California, the arroyo toad is now endangered, driven from 75 percent of its former range. Only 22 populations are known south of Ventura County, so it’s great news that the U.S. Forest Service closed 3,000 acres of the 650,000-acre Angeles National Forest to use (including ATVs) until February 2003 to help the toads recover. Even noise from a nearby campfire has been shown to disturb the males’ mating calls. [*The Daily TriPLICATE*, January 27, 1999, from Bradford Norman] Only a few days later, organized off-road vehicle users are reported to be “furious” over the closures. A rider says, “This isn’t about the toads, it’s about us. The Forest Service has been trying to get rid of off-roaders for the past five or six years. They blame us for the trash and all the damage here, but it’s not us doing it.” [*Sacramento Bee*, February 1, 1999, from Wes and Kim von Papineäu]

5/16ths of an inch in 10 years

Salamander stories are so few and far between that I’ve kept all their clippings in one slender file. Now—in one month—come three more salamander stories, two from the February 10, 1999, *Baltimore Sun* from Mark Witwer. “Yikes,” starts the photo caption which continues, “State Comptroller . . . seems less than thrilled with a tiger salamander being restrained by [a worker with] the Department of Natural Resources and [Maryland’s] governor. . . . The reptile made an appearance yesterday at the State House.” Oops. Tiger salamanders aren’t reptiles. The wee beastie was at the state house because the state is planning to spend nearly \$300,000 to buy the home of the state’s largest-known surviving population

of this struggling amphibian. A local ecologist said that tiger salamanders are “classic victims of habitat destruction.” The plan includes other purchases including 439 acres for nearly \$400,000 to save a rare plant. Meanwhile *China Daily* reports that thieves made off with 16 of 17 giant salamanders on display at Southwest China’s Chongqing Zoo on December 10. Officials said all were older than 10 years of age; the one remaining female is over 40 years old. [December 17, 1998, from Wes and Kim von Papineau]

See you later?

Workers at Brookfield Zoo hope that their two, tiny hand-raised green sea turtles will survive their open ocean life and return to their release point in Hawaii in about 2015 when they are sexually mature. “Magnum” and “Higgins” were the first turtles provided to Brookfield from the program sponsored by Oahu’s Sea Life Park Aquarium. Turtles were sent to zoos around the nation for head-starting and to raise awareness of sea turtles issues. [*Chicago Tribune*, February 16, 1999, from Ray Boldt and Claus Sutor]

Or maybe not

Invasive water snakes in Lafayette Reservoir apparently died out completely and experts are puzzled as to what caused their decline and local extinction. The snakes are native to North America, but not to California. Fishermen had complained, boaters had complained as the diamondback water snakes gulped down frogs and turtles as well as stocked fish. Some have suggested the especially wet El Niño weather system as the cause. Others have asked why an aquatic species as tenacious as a water snake would be harmed by a wet weather system. [*Contra Costa Times*, January 31, 1999, from Wes and Kim von Papineau]

Less is same

Frogs feel pain. Researchers had long felt that since frogs only have one kind of pain receptor that they didn’t feel pain in the same way as “higher” vertebrates, which have three receptors. Surprise then, awaited a researcher at Oklahoma State University when he found that analgesics that work in humans work in frogs and that the potency of these analgesics in frogs matches the potency in mammals. [*Science News*, Volume 155, February 6, 1999, from Mark Witwer] Weep, then, for the frogs who die in agony for dissection and for those mutilated by “toe clipping” or other “humane” scientific methods. Weep for us also; too self-centered to see or feel the pain of other species, or even our own newborn male children.

Local coop legally harvests sea turtle eggs

The 300-member legal egg-harvesters cooperative at Ostional, Costa Rica, has worked out a deal whereby their members can harvest sea turtle eggs for the first three days of each wave of turtle nesting. Authorities believe the indigenous peoples’ reports that the first lays are usually crushed by later arriving turtles’ nest excavations. The government also grants 1,600 permits to kill sea turtles along the Tortuguero coast. The Caribbean Conservation group estimates that 8,000 more turtles are illegally harvested each year and claim that Costa Rican authorities do not enforce the hunting laws and do not

fund anti-poaching initiatives. A spokesperson for C.C. said, “We have to learn that turtles can generate more money alive than dead, because of the tourists they attract.” [New Orleans *Times-Picayune*, December 29, 1998, from Ernie Liner]

Eggs-celent source of vitamins and minerals, eh?

Nutrients provided by sea turtle eggs and fecal material provide the “bottom of the chain” for much of the Melbourne, Florida, beach ecosystem studied by researchers from the University of Florida. These nutrients are gathered by the sea turtles thousands of miles away and deposited where plants and local animals can get them. The loss of sea turtles may result in increased erosion and increased cost to beach front communities for beach stabilization. [*National Wildlife* April/May 1999, from Mark Witwer]

\$200 million talks

The Austin *American Statesman* reports that the Texas Gulf of Mexico shrimp industry brings in about \$200 million a year to the local economy. Texas’s Padre Island National Seashore has now hosted nesting Kemp’s ridley sea turtles while shrimpers have filed a challenge in federal court against using turtle excluder devices in their nets. A biologist with National Marine Fisheries point out that shrimping “is the biggest single cause [of sea turtle strandings],” but a shrimping activist replied, “they do die of natural mortality once in a while, and they do die of pollution, and . . . disease. I think this is what everybody forgets.” Records show that there have been 379 stranded sea turtles along Texas shores since 1998 with 37 adult Kemp’s ridley sea turtles lost in 1998 alone. [January 4, 1999, from William Montgomery] Shrimpers should also check out the cash box. A report in the Leesburg, FL *Daily Commercial* says “Shrimp lovers are in for a treat . . . low prices. A jumbo shrimp harvest along with fewer export sales to Asian fish markets combined to drop the price of shrimp to about a dollar a pound less than last year.” [from Bill Burnett] I’ve got an idea. Instead of millions of dollars in enforcement and hard feelings all around, how about a one-time only investment in a fixed number of TEDs. We’ll buy one for every boat on the water on a particular day minus any commissioned between the announcement and the day announced. (No fair adding boats.) Then treat the TEDs like taxi medallions in New York or Chicago—only boats with government purchased TEDs can shrimp. In return, current shrimpers are guaranteed a life style, we save a life form and we all go home happy. Or is that too easy for the U.S. in the quarrelsome nineties?

Native versus native

Ravens following development in the Southwest are eating desert tortoise babies. One researcher said that until their shells harden around seven years of age, baby tortoises are “like walking raviolis,” to the ravens. Other threats include loss of habitat, road kills and an upper respiratory disease. [*National Wildlife*, April/May 1999, from Mark Witwer]

INHS websites

The Illinois Natural History Survey has posted the entire amphibian and reptile collection and part of the insect collection at <www.inhs.uiuc.edu/cbd/herpdist/herp.html>. They

are working on a geographic information system (GIS) which will permit remote users to produce maps of species distributions based on collections data. [Reports of the Illinois Natural History Survey, March/April 1999] They don't say, but I suspect Illinois State Herpetologist Chris Phillips had a lot to do with the herp database! It's really neat. You should visit.

Strange genefellows

Researchers at Pennsylvania State University have found that crocodiles are more closely related to turtles than to lizards, snakes and birds, putting turtles in the middle of the reptile family tree—rather than on a slender branch off to the side. In addition, tuataras have been placed closer to crocodiles than lizards. The full study is in the February 12 *Science*. [Science News, March 6, 1999, from Mark Witwer]

To bite or not to bite, that is the question

- Researchers working on Arizona's twin-spotted rattlesnake report that weather, not snakebite, is their major field worry. One graduate student handled about 100 specimens without a single bite. The researcher pointed out that most of the 200 rattlesnake bites reported in Arizona result from people (often young males) "messing with the snakes." [Tucson Citizen, March 8, 1999 from Tom Taylor]

- "Daddy, there's a rattler on the sand pile," cried a child on the Canadian Bruce Peninsula where endangered massasaugas are a fact of life. Residents are urged to help perpetuate the species, not decimate it. Workshops and outreach by the Toronto Zoo and wildlife officials have resulted in a human/snake partnership not common on this earth. Incidentally, "Daddy" came and moved the 2-foot massasauga off into the woods. The kids went back to playing in the sand. [Rattlesnake Tales, Spring 1999, from Bob Johnson]

- On a sadder note, a 21-year-old Phoenix, Arizona, man died at the fangs of his roommate, a 20-inch diamondback rattlesnake. When found on the floor of his bloodstained apartment, he had been dead for hours. The snake was found under shards of glass in its tank. Possession of venomous snakes is not illegal in Arizona; selling them is outlawed. This owner apparently free handled the animal often and showed his neighbors and others that he let it crawl all over him. Police report the man had been drinking earlier in the evening and speculate he may have been trying to feed the snake. [The Tribune, January 12, 1999, from Tom Taylor]

- "What does it take to make a cottonmouth strike?" asks a sidebar in *Natural History Magazine* (11/98). The article by Whit Gibbons and Michael Dorcas is about field methods in their study, which looks at what exactly makes a cottonmouth decide its day has been ruined enough to ruin yours, too. What they found was that venom is used as a last resort; snakes usually choose not to waste it on an item too big to be food.

Love's labour lust?

- The Shedd Aquarium recently sent their 16-year resident giant alligator snapper to the Tennessee Aquarium as part of a breeding loan. He was weighed (249 pounds), packed and

shipped in a van for his 10-hour drive to the Chattanooga palace of love. The alligator snapper is a state threatened species in Illinois; other states list them as threatened and endangered. [Shedd News, early 1999?] I wish some of these journals would put source/date on each page!

- Frank and Kate Slavens have done it again. Their latest *Reptiles and amphibians in captivity: Breeding, longevity & inventory current January 1, 1998*, weighs in at 423 pages, lists 33,659 specimens in 311 worldwide collections. See older records on the web <www.halcyon.com/slavens/>. The latest version is available from the authors by writing P.O. Box 30744, Seattle, WA 98103.

Time to ante up

For those who have supported the Wildlife Conservation Society Turtle Recovery Program in the past—thank you. Projects have been funded in North, South and Central America, Asia and Africa. Results are in press or being published in journals worldwide. Turtles and tortoises everywhere benefit. You can support them by sending your checks to "WCS – Turtle Recovery Program." Mail to Dr. Michael W. Klemens, International Conservation Wildlife Conservation Society (Bronx Zoo), 2300 Southern Boulevard, Bronx, NY 10460-1099. I only wish they had a nifty website where all this would be available to you!

Thanks to everyone who contributed and thanks to Wes and Kim von Papineau, Walt Loose, Sam Ristich, Vicky Elwood, Ernie Liner, Ray Boldt, Jack Schoenfelder, Claus Sutor, Ellis Jones, Gary Fogel, Lori King-Nava, *MOKO*, David Blatchford, Roger Repp, Mike Pingleton, Karen Furnweger, Roger Featherstone, Jack Fertig and Elias Trevino for all their letters, cards and contributions to herpetology this month. You can contribute, too. Send the whole pages, or cut clippings, but be sure the publication name/date slug and your name are firmly attached to each piece (those freebie address labels work great for this!) and mail to Ellin Beltz, 1647 N. Clybourn Avenue, Chicago, IL 60614-5507. I held back only three clippings for next month. Help!!!



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Herpetology 1999

In this column the editorial staff presents short abstracts of herpetological articles we have found of interest. This is not an attempt to summarize all of the research papers being published; it is an attempt to increase the reader's awareness of what herpetologists have been doing and publishing. The editor assumes full responsibility for any errors or misleading statements.

EUPHRATES SOFTSHELL TURTLES

E. Taskavak and M. K. Atatür [1998, Chelonian Cons. and Biol. 3(1):20-30] report that the Euphrates softshell turtle, *Rafetus euphraticus*, largely confined to the Euphrates and Tigris basins, is a thermophilic species. It prefers relatively calm tributaries and oxbow lakes. It is largely carnivorous, but sometimes consumes plant material. The northernmost limit of its range in Turkey in the Euphrates basin is between Karakaya and Atatürk dams. The population in this area is in jeopardy because of decreased temperatures of the dam impoundment waters (min. 7°C, max. 12°C during the summer months) and a lack of suitable sandy banks for nesting. Information on status of the species in the Tigris basin in Turkey is scarce. The three completed dams on the Euphrates (Keban, Karakaya, and Atatürk), and two others under construction (Birecik and Karkamis) seriously threaten the survival of the species in southeastern Anatolia. Former basking and nesting areas are now submerged, and daily water level fluctuations complicate the establishment of new nesting sites. The authors surveyed the distribution of *R. euphraticus* prior to and after the construction of Atatürk Dam. The number of suitable habitats and apparent population levels have declined and the authors conclude that the species is endangered in Turkey.

VARIATION IN REPRODUCTION AMONG ILLINOIS RED-EARED SLIDERS

J. K. Tucker et al. [1998, J. Herpetology 32(4):515-526] report on variation in reproductive traits among 789 red-eared sliders (*Trachemys scripta elegans*) from three sites in west-central Illinois from 1994 to 1996. Overall, mean clutch size ranged between 12.5 and 15.1 eggs, mean egg mass per clutch ranged between 10.03 and 11.68 g, and mean relative clutch mass (clutch mass/spent body mass) ranged between 0.079 and 0.097 for nine site-year cohorts. Maternal body size was the most important source of variation in all measures of reproduction because larger females laid larger eggs and larger clutches than smaller females. Reproductive output independent of body size was greater in 1995 than in 1994 or 1996. Clutch size and egg size varied similarly among years at each site. Overall, clutch mass in 1995 was 15.8% and 17.8% greater than clutch mass in 1994 and 1996, respectively. This variation in reproductive output was primarily due to changes in egg number rather than changes in egg size, consistent with theories of egg optimality. Turtles at one site produced relatively small but relatively more eggs per clutch than turtles from the other two sites. This pattern persisted despite varying amounts of energy devoted to reproduction from year to year. However, an egg size-clutch size trade-off among nine site-year cohorts could be demonstrated only weakly. Geographic variation was confirmed for clutch size, which decreased with decreasing latitude, but not for egg mass and plastron length.

A NEW SPECIES OF TEGU FROM BRAZIL

G. R. Colli et al. [1998, Herpetologica 54(4):477-492] describe *Tupinambis cerradensis*, a new species of tegu lizard from central Brazil. *T. cerradensis* is apparently endemic to the Cerrado biome and associated with gallery forests. *T. cerradensis* is sympatric with *T. merianae*, and probably with *T. rufescens*, throughout its range. A discriminant analysis of eight size-independent morphometric variables and body size indicated that relative limb size is the most striking difference among the species of *Tupinambis*, and that the discriminatory power of morphometric characters is low. A discriminant analysis of 10 meristic characters indicated that the number of femoral pores, dorsals, and scales around midbody are the best discriminators among the species of *Tupinambis*, and that the discriminatory power of meristic characters is high. Allelic frequencies from six variable presumed electrophoretic loci produced greater genetic distances between *T. cerradensis* and *T. merianae* than between *T. cerradensis* and *T. teguixin*. *Tupinambis cerradensis* feeds mostly on arthropods and mollusks, ingesting much less plant material and vertebrates than the larger species of the genus. A key to the five recognized species of *Tupinambis* is included.

LARGE IGUANIDS IN URBAN MOUNTAIN PRESERVES

B. K. Sullivan and M. A. Flowers [1998, Herpetological Nat. Hist. 6(1):13-22] surveyed the Phoenix mountain preserves of northcentral Maricopa County and the South Mountains of southcentral Maricopa County, Arizona, for presence or absence of four large (snout-vent length > 100 mm) iguanid lizards (*Crotaphytus* spp., *Dipsosaurus dorsalis*, *Sauromalus obesus*, and *Sceloporus magister*). Although located on the outskirts of Phoenix when established in the late 1950s and early 1960s, these preserves have been surrounded by urban sprawl during the past 40 years as the Phoenix metropolitan area expanded. *Sauromalus obesus* was the only taxon found in all preserves surveyed; *S. magister* was found in North Mountain and Squaw Peak preserves and the South Mountains, but not in Lookout or Shadow mountain preserves. Neither *Crotaphytus* spp. nor *D. dorsalis* were observed in the northern preserves, but *D. dorsalis* was observed in the South Mountains. Density estimates were possible only for *S. obesus*; too few individuals of *S. magister* were located for estimation of population sizes. In the three preserves for which adequate data were available (Lookout, Shadow, Squaw), density of *S. obesus* ranged from 2.3 to 7.6 adults per ha. By comparison, density of *S. obesus* at the South Mountains, an additional preserve to the south of the mountain preserve sites, was 62.3 individuals per ha. Densities of *S. obesus* from the three Phoenix mountain preserve sites were low relative to populations in southern California, the only area other than the South Mountains for which comparable data are available.

HOW TO HISS LOUDLY

B. A. Young [1998, *Hamadryad* 23(2):103-110] conducted acoustic analyses of Russell's viper, *Daboia russelii*. The analysis revealed that these snakes produce a hiss with a mean amplitude of over 82 dB, well above the intensity of most other snake sounds. The frequency range (mean minimum frequency = 471 Hz; mean maximum frequency = 13,925 Hz) and dominant frequency (mean = 8,201 Hz) are similar to those reported from other snakes. The most prominent morphological specialization found in the respiratory system of *D. russelii* is the expansive external nares, which are a diagnostic feature of this species. To determine if the large nares were responsible for increasing the amplitude of the hiss, polyethylene tubing was inserted into the nasal cavity. Hisses produced with the tubing in place had a similar frequency range but decreased in amplitude by over 12 dB.

TRACHEAL AIR SACS IN THE RED-TAILED RATSNAKE

H. B. Lillywhite and T. M. Ellis [1998, *Hamadryad* 23(2):121-126] examined the gross structure of tracheal air sacs (diverticula) and their use in defensive displays in the Asian ratsnake *Gonyosoma oxycephalum*. Tracheal air sacs are non-respiratory structures that are anatomically distinct from the lung and tracheal airway. They function in *Gonyosoma* to inflate the neck and thereby exaggerate vertical neck displays during defensive postures. In this context tracheal air sacs represent alternative specializations, inasmuch as inflation and display of the neck are achieved in other species with a distensible tracheal airway. The evolution of tracheal air sacs has resulted in striking morphological divergence at low taxonomic levels, yet their origin and adaptive significance remain elusive.

EFFECTS OF LIVESTOCK ON ROCK IGUANAS

N. C. Mitchell [1999, *Herpetologica* 55(1):7-17] examined distribution, population density and structure, diet, habitat use, homerange dynamics, and physical condition of the Anegada population of *Cyclura pinguis* using ground surveys, interviews with residents, mark-and-recapture estimates, fecal analysis, feeding experiments, radiotelemetry, and life-history data. When compared with a 1968 study, the density of the extant population at a 43-ha study site was 0.36/ha, as opposed to 2.03/ha. Leaves represented only 38% of dietary volume, in contrast to 71% in 1968. Fruit comprised 56% of the diet. Well fed individuals of *C. pinguis* from a relocated population on Guana Island would not eat the leafy components of the Anegada iguanas' diet. Home ranges on Anegada overlapped and were 100 times larger than previously recorded. The sex ratio was two males to one female as opposed to 1:1 in 1968. Iguanas had proportionately lower body mass than animals captured in 1968. Population decline on Anegada seems largely due to increased competition from livestock, managed in 1968 but now feral, eating most palatable vegetation from the understory. Predation by cats and dogs is also a threat. The total remaining population is estimated at <200 individuals. A national park designed to protect the endangered population of *C. pinguis* has been proposed for Anegada.

TRANSLOCATION OF TIMBER RATTLESNAKES

H. K. Reinert and R. R. Rupert, Jr., [1999, *J. Herpetology* 33(1):45-61] experimentally assessed the impact of translocation on timber rattlesnakes (*Crotalus horridus*) by moving 11 specimens distances of between 8 km and 172 km away from their native populations and releasing them into a study area having a resident rattlesnake population. All translocated snakes were equipped with radio transmitters, and their behavior, survival and interaction with resident snakes were observed. Eighteen resident snakes were also telemetrically monitored during the four-year study. Six of the 11 (54.5%) translocated snakes are known to have died while only two of the 18 (11.1%) resident snakes experienced mortality during the period they were radiotracked. Of the six translocated specimens that died, three experienced overwinter mortality despite their location of resident hibernacula, two were killed by predators, and one died from disease. The mean daily survival rate of translocated snakes (0.9973) was significantly lower than that of resident snakes (0.9993). Translocated snakes selected habitats similar to that of residents, foraged successfully, and maintained body mass. However, translocated snakes exhibited atypical movement patterns consisting of extensive and long-distance traveling. The six translocated male rattlesnakes averaged 15,017 m (SE = 2184.3) in total distance traveled from release until hibernation with daily movements of 123.8 m (SE = 19.40) and convex polygon activity range areas of 600.6 ha (SE = 253.0). Comparatively, the total active season distance traveled by the seven resident male rattlesnakes averaged only 5575 m (SE = 936.5) with mean daily movements of 36.9 m (SE = 5.36) and convex polygon activity ranges of 59.9 ha (SE = 13.04). Mean activity parameters three to five times larger than those of resident snakes were also typical for translocated female rattlesnakes. Translocated snakes located active hibernacula apparently by following resident snakes; however, their overwintering mortality was higher than that of residents. Translocated snakes that successfully survived the first overwinter period continued to exhibit more extensive movements in their second active season than did residents. However, there was evidence of the establishment of a more resident-like pattern of movement among these specimens during the second year. Translocation of adult snakes is not recommended as a standard conservation practice because of its immediate and long-term negative impacts.

FOSSIL FOX SNAKES

D. Parmley and D. Walker [1998, *Herpetological Nat. Hist.* 6(1):41-46] report on vertebral remains of the living rat snake *Elaphe vulpina* from the Blancan (2.85-2.95 mya) Taunton local fauna of Adams County, Washington. The vertebrae represent the northwestern-most fossil occurrence of *E. vulpina*, significantly expanding the species' Blancan distribution. A review of the species' distribution over the past 5 million years shows that a significant range contraction of the species took place between the late Hemphillian (5 mya) and at least the Pleistocene-Holocene transition period (cf. 11,000-10,000 ybp).

REPRODUCTION IN ALPINE SLOW WORMS

M. Capula et al. [1998, Herpetological Nat. Hist. 6(1):33-39] studied the reproductive pattern and mating system of *Anguis fragilis* in natural populations from a mountain territory of northeastern Italy (Sella Nevea, Tarvisio Forest, Carnic Alps). Mating occurs between April and May, while parturition takes place from mid-August to mid-September. In most cases, females reproduce in alternate years. Courtship and mating are usually stationary events which take place within bushes. The most spectacular characteristic of this mating system is the occurrence of sexual combat between males for access to females. Male body size is shown to be a crucial determinant of mating success, as body size of males defeated during sexual combats was always smaller than that of the winners. The facts that (1) large males win over small males during sexual combats, and (2) fighting time tends to increase when two similarly-sized males engage in a fight, suggest the existence of size-based male dominance in the studied populations.

CIRCANNUAL RHYTHMS IN THE RINKHALS

G. J. Alexander and R. Brooks [1999, Copeia (1):146-152] present evidence that appetite and the probability of ecdysis vary seasonally in the temperate African elapid *Hemachatus haemachatus*. The periods of lowest food acceptance, and lowest probability of shedding, coincided with the late autumn and winter months of May through July, and the authors interpret these patterns as adaptations to avoid the costs of arrested digestion and of ecdysis during the coldest part of the year. The seasonal patterns documented by the authors have persisted in the experimental animals without measurable attenuation for seven years to date, despite the snakes being kept at constant temperature (25°C) and photoperiod (12:12 h) for the duration of the study. Because these are the most likely cues for exogenous control of the seasonal patterns observed, the authors argue that they have provided good evidence that these rhythms are, at least partly, under endogenous control.

DESERT NIGHTSNAKE FEEDING ECOLOGY

J. A. Rodríguez-Robles et al. [1999, Copeia (1):93-100] studied the diet of the North American desert nightsnake, *Hypsiglena torquata*, based on the stomach contents of 397 museum specimens, field observations, and published dietary records. Based on 92 prey from throughout much of its distribution, *H. torquata* feeds mainly on sceloporine lizards and squamate eggs and occasionally eats frogs, snakes, insects, and amphisbaenians. Lizards are typically swallowed head-first, whereas frogs are swallowed from the rump. Prey mass increases with snake mass and prey/predator mass ratios range from 0.03 to at least 0.50. Three genera of abundant lizards (*Cnemidophorus*, *Coleonyx*, *Xantusia*) are infrequently eaten, which suggests that these lizards chemosensorily avoid desert nightsnakes. *Hypsiglena* arose within a Neotropical clade of predominantly nocturnal, frog-eating snakes, and its occupancy of and western North America correlates with two derived feeding traits: at least occasional ambush predation on diurnal lizards, and inclusion of squamate eggs in its diet.

SERENGETI LEOPARD TORTOISES

M. R. K. Lambert et al. [1998, Chelonian Cons. and Biol. 3(1):46-57] report that leopard tortoises, *Geochelone pardalis*, in Serengeti National Park, Tanzania, associated with open woodland and regularly exposed to bushfires, were smaller than those in unburned areas of northeast Tanzania outside the park. Tortoises in unburned National Parks tended to be larger than those in unprotected areas. Tortoise size did not differ in cattle-grazed Masai steppe and village-settled agriculturally developed areas, possibly indicating that local people did not utilize tortoises. Serengeti tortoises bore burn-scarred carapacial scutes, and survivorship declined rapidly to zero by year 21, in contrast to those at Hargeisa, northwest Somalia, in which 50% still survived by year 25. Compared to those in northwest Somalia, and elsewhere in eastern and southern Africa, in which growth continued up to 24 yrs and greater maximum sizes were achieved, Serengeti tortoises attained a size at 12 yrs not reached until 13 and 18 yrs, respectively, by those of northwest Somalia and elsewhere. Size frequencies indicated that leopard tortoises at Hargeisa, northwest Somalia (9°30'N), tended to be larger than those in the eastern Cape Province, South Africa (32–34°S). These in turn exceeded those at latitudes of 2–4°S (northeast Tanzania) to 18°06'S (west Zimbabwe); tortoise sizes were very similar in the two latter areas. In Serengeti tortoises, the allometric relationship between carapace length (y in mm) and body weight (x in g) was $y = 1.17x^{0.35}$; weight range was 24 g–9.9 kg. Females grew on average faster than males, achieving an asymptotic size at 12 yrs that was not reached by males until about 15 yrs, at which age the sexes were not significantly different. Assuming annual deposition of growth annuli, scute increments were greatest in both sexes during years 3–10, but there was considerable annual variation within and among individuals of the one population. Growth of the vertebral and pleural scutes in Serengeti tortoises was pyramidal (areolae on knolls). Mean annular growth did not correspond with seasonal rainfall over the range 341.1–812.3 mm. Mean Serengeti hatchling and asymptotic carapace lengths were calculated at 50 and 288 mm; the former was greater and the latter lower than corresponding values for northwest Somalia and elsewhere. Serengeti females above 210 mm plastron (240 mm calculated carapace) length became more rotund than males.

FLAT-TAILED HORNED LIZARD HABITAT

B. Beauchamp et al. [1998, J. Herpetology 32(2):210-216] note that the habitat of the flat-tailed horned lizard (*Phrynosoma mcallii*) is usually described as desert flats with fine, aeolian sand, at the edges of or away from dunes. At Ocotillo Wells State Vehicle Recreation Area the highest densities of *P. mcallii* were correlated with sparsely vegetated gravelly habitats and mud hills. These findings suggest that either *P. mcallii* has shifted or dispersed to other habitats as a result of off-highway vehicle activity in sandy areas, or that the species has wider habitat preferences than previously described. No apparent correlation existed between lizard and scat densities suggesting that scats may not be a reliable indicator of lizard abundance and distribution in this population.

Some Last-minute Thoughts on ReptileFest '99

by Gary Kostka

This is it. Last call. Time to put your monitor where your mouth is. ReptileFest '99 is just days away, and if you're still undecided on whether you should participate in this herpetological extravaganza, let me give you just one bit of advice: It's time to do your business or dismount from the commode. (Or should I have said Komodo?)

Do you and your herps long for the limelight? Perhaps you pine for plaudits from the public. Why not let ReptileFest '99 be the vehicle that enables you to realize those dreams? The plucky members of the ReptileFest planning committee have devoted months of tireless effort toward the organization and promotion of this year's show. Their single-minded dedication to duty has virtually guaranteed that ReptileFest '99 will attract record-breaking crowds and extensive media coverage. In my humble opinion, you simply can't afford to miss it.

Non-participation in ReptileFest may very well have a devastating effect on your emotional well-being. Picture this scenario if you will:

It's the weekend of May 1-2. You're sitting alone in your darkened living room, ensconced in the cozy embrace of your Barco Lounger as you watch the late news. The sound of the television recedes as you begin to drowse. Suddenly, you're jolted out of your torpor, subliminally alerted by the barely discernible mention of the word "ReptileFest" in the ongoing newscast.

You gather your wits in time to hear the anchorperson's ebullient description of the taped highlights from that day's 'Fest, which you view through slightly bleary eyes. Your attention is transfixed by the images of happy CHS members and their herptile companions emanating from the screen, bathing the room in an eerie, flickering light.

As the report concludes, you turn off the TV. With one last swallow from a can of lukewarm Mr. Pibb, you rise and brush the barbecue-flavored potato chip crumbs from your chest. You trudge off to bed, utterly dejected by the staggering realization that you've squandered a golden opportunity for fun and fame by failing to take part in ReptileFest '99. The solace of slumber proves elusive as you lie in your self-made bed, tormented by the psychological demons destined to haunt you in the days and months to come.

Not a pretty picture is it? Thankfully, it's one that can be avoided, but you must act quickly in order to do so. Contact **Lori King** at (773) 477-3645 or **Gary Fogel** at (773) 935-6938 and let them know that you'd like to take part in ReptileFest '99. They're the 'Fest coordinators and they're anxiously awaiting your call.

If you plan to exhibit herps, they'll need to know the type and number so that adequate table space can be reserved for their display. I cannot overemphasize the necessity for you to initiate this process with expedience. In fact, why not make the call just as soon as you've finished reading this paragraph? (Please be so kind as to read the remainder of the

article when you're done, though.) They might have to shoe-horn you in between the tuataras and the Fiji Island iguanas, but by golly, I know they'll be glad to do it!

What's that you say? Your animals are unwilling to leave the security of their happy homes. Well, that doesn't mean that you've got to miss out on all the fun. Au contraire, my hesitant herpetophiles. Even if you've got nary a newt to bring along, there are plenty of alternative ways to take part in ReptileFest '99.

Herpers willing to lend a helping hand will be needed throughout the course of the ReptileFest weekend. This includes show set-up, during the afternoon and evening of Friday, April 30, and breakdown, immediately following the show's completion on Sunday, May 2. Whatever your age, interests or abilities, there'll be plenty of things that you can do to assist the CHS in this mammoth undertaking.

Helping out at ReptileFest is the ideal opportunity to put something back into the Society while meeting lots of friendly, fascinating folks with similar interests to your own. And the beauty part is that all of this fun and camaraderie takes place amidst an assemblage of herps and herp related products so awesome and varied as to make even the most jaded herpaholic break out in a cold sweat. Quite frankly, it's just too darn good to pass up.

Call Lori or Gary at the numbers listed above and let them know you're eager to lend a hand. Characteristically, help is in greatest demand (and shortest supply) during show set-up and breakdown, so those contributing their time and effort during these critical phases will most assuredly win an everlasting place in the hearts of the 'Fest coordinators.

Unable to exhibit and can't afford the time to assist? Come on out to ReptileFest '99 anyway and bring along your family, friends, co-workers, lodge brothers or anyone else you may remotely know. Boosting the show's gate is a contribution held in high regard by the 'Fest committee. You'll also benefit from an increased social status and a heightened sense of self-esteem for having shown your guests such an outstanding time.

At the very least, you should bring yourself to ReptileFest '99. You'll have a fantastic time, and, who knows, it just might inspire you to take part in ReptileFest 2000.

If you're already on board for 'Fest '99, then allow me to take this opportunity to say thanks in advance. Without your participation and generosity this show could not take place. Over the course of the previous five ReptileFests I've heard numerous complimentary remarks from visitors regarding the friendly, patient attitudes of the exhibitors and their willingness to share their animals with the public. This type of positive interaction serves to legitimize our hobby in the eyes of the public and helps to sway the opinions of those who may be less fond of herps than ourselves. This is truly what ReptileFest is all about.

I strongly urge anyone exhibiting at ReptileFest '99 to set up their display on Friday, April 30, between 3:00 and 10:00 P.M. This will ensure that you are ready to go at 10:00 on Saturday morning for the show's opening.

After completing the set-up of your own exhibit, pause for a moment and take a look around you. If you see people scurrying about with panic-stricken looks on their faces, you may safely assume that there is still more work to be done. Find the nearest person muttering to themselves (this will most likely be either **Lori King** or **Gary Fogel**) and ask them what you can do to help. With any luck, they'll be able to give you coherent instruction as to how your energies may best be put to use.

On Sunday evening, following the departure of the last guests and the disassembly of your own exhibit, you may reapply the previously described techniques. What I'm saying is: Don't just pack up your stuff and make a beeline for the exit. Stick around for awhile and lend a hand for the greater good of the group.

CAUTION: If you should find either of the above-mentioned coordinators cackling dementedly in a corner of the

auditorium during show set-up or breakdown, approach them slowly and speak to them only in low, comforting tones. Reassure them that everything will be all right, then prod them gently back toward the center of activity. Wait approximately 3-5 minutes. At this time it is probably safe to re-approach them and offer your assistance or ask any questions that you may have.

Well, that's it. You've put up with two months of my prodding and persuasion concerning your participation in ReptileFest '99. Hopefully, the next words of mine on which you'll cast your eyes will be a triumphal accounting of the show's phenomenal success.

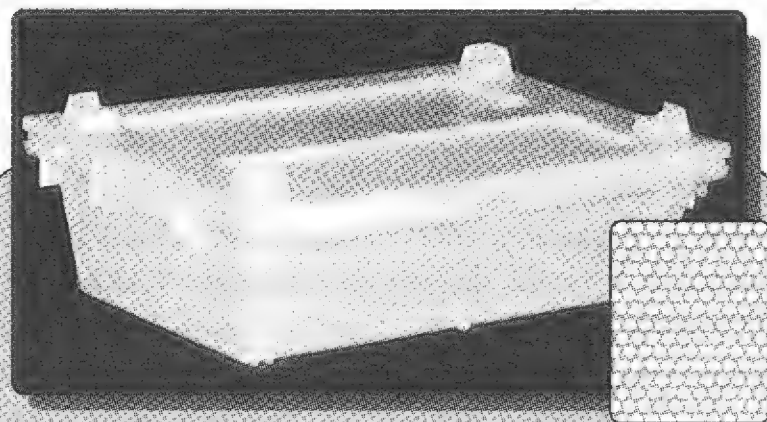
We're standing on the verge of what could be a monumental chapter in the annals of the CHS, but it's going to require an army of dedicated members to make it a reality. Please, set down your can of Mr. Pibb while there's still time and join the ReptileFest regiment as we march into herpetological history!

ReptileFest '99. It's hip, it's herps and it's happening . . . hopefully with you.

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Unofficial Minutes of the CHS Board Meeting, March 12, 1999

The meeting was called to order at 8:05 P.M. Board members Lisa Koester, Steve Spitzer and Jenny Vollman were absent.

Officers' and Committee Reports

The minutes of the February Board of Directors meeting were read and accepted.

The Treasurer's report was read and accepted.

Membership: Membership stands at approximately 900. Gino Martinez reported that people have been showing strong interest through E-mail.

Speaker Update: Mike Dloogatch handed out a list of upcoming speakers through July which included: Gordon Rodda; Tanya Chan'ard, Brian Stuart and John Murphy; Tom Tynning; and David Chiszar.

Adoptions: Audrey announced that adoptions are picking up but iguanas are still plentiful.

Shows: Jack Schoenfelder asked for volunteers to participate in a show at a new nature center in Indiana with which he is associated.

ReptileFest: Lori King-Nava reported that more help is needed at the 'fest. *Chicago* magazine called the CHS and there is a strong possibility that the 'fest will be included in the May issue which is due to come out near the end of April. Security will probably be provided by the Klingons again this year. The Chicago Academy of Sciences is waiting for approval to participate in ReptileFest but their new management is not really familiar with the CHS. Participants will include: Bob Bavirsha; Jim Nesci, along with Bubba the alligator, an albino python, and various monitors which will be on hand for pet-and-learn sessions; and Ron Humbert who will display tortoise fossils in addition to his usual set-up. The Chicago Turtle Club has included information about ReptileFest on its website.

Old Business

Audrey has confirmed Saturday, June 19, for the Louisville Zoo trip. The zoo has a new herp building, two young Komodo Dragons, and Cuban crocodiles. The Louisville Herp Society will also attend.

The permit for the CHS picnic has been secured for Sunday, August 22, from noon to dusk at the Catherine Chevalier Woods.

There will be a parasitology class on May 29 by Cheryl Roge D.V.M. at the Grove in Glenview. Space is limited.

Ron Humbert plans to bring doughnuts and coffee for the Salamander Safari, which will take place at Camp Sagawau on March 27 from 9:00 A.M. to noon. No motion to reimburse was needed because the total purchase was to be less than \$25. Ron reminded everyone that there will be no collecting of specimens and that proper dress would be wise because of the mud.

Jack Schoenfelder made out reasonably well at the February general meeting with his "Reptiques," and felt that it was worth doing. He feels this has good potential and the Board members like the idea and also felt the trial sale went well. Jack noted that there could be a space problem. It was decided that no animals or animal parts should be for sale, but plants, driftwood, and moss would be acceptable. The question arose about charging a nominal fee for the space, and it was decided that problems and questions would be addressed as they arise.

New Business

Mike Dloogatch informed the Board that House Bill #2243 was proposed which would "delist" three endangered species to make way for developers to build on Carlyle Lake. The Illinois Department of Natural Resources opposes this and people are encouraged to contact their state representatives. Jennie Picciola volunteered to E-mail everyone with more information about this and would like E-mail addresses.

Audrey distributed name badges for the Board members to wear at the general meetings.

Lori moved to donate a part of the proceeds from ReptileFest to the International Iguana Society (the amount to be determined by the Board after ReptileFest). The motion was seconded by Karen Bielski and the vote was unanimous in favor.

Gary Fogel stated that members' nights at the Field Museum would be May 6-7, and the CHS would again display animals. Jennie then suggested that the CHS might possibly participate in members' night at the Shedd Aquarium.

Round Table

Gino Martinez asked who was responsible for making the new membership list. He was informed that it was his job.

Lori King-Nava congratulated Byron and Tracy de la Navarre on their new son Tristan and everyone concurred.

Ron Humbert said he would like the ReptileFest applications in as early as possible

Jennie Picciola showed everyone her new herp socks.

The meeting adjourned at 9:50 P.M.

Respectfully submitted by Recording Secretary Karen Bielski

Letter from the President

Dear Members:

Welcome Spring! Ah, yes what a nice thing to be able to say. Now that we have been able to take in a breath of fresh air, we can clear those winter foggy heads and think about . . . activities! There are activities ahead for all of us! Most of the information will be located at the inside back page of the *Bulletin*. That will include info on the upcoming CHS field trip to the Louisville Zoo, the Herp Parasitology class, the CHS picnic and of course, by the time you all get your *Bulletin*, ReptileFest will be a few short days away.

At the last meeting, I placed a memo at the membership table, asking for those with E-mail addresses to allow me to include them in my CHS internet database. I had several people do so and it's been a good start. This database will be a useful tool in communication when it comes to matters of utmost importance, such as the recent E-mail/telephone campaign regarding House Bill 2243. Those of you who helped bombard the state offices with letters, phone calls and E-mails were kept abreast of the situation via E-mail. Although the bill has moved on to the senate, we were noisy enough to impact the decision to amend the bill. I'd like to believe it so! We made full use of the Internet to get ourselves heard. As your president, I did my best to update those on the database on what was happening. I found it particularly amusing when one of my phone calls to Mike Madigan's office elicited a nasty response from his secretary, proclaiming, "Why are so many people calling about this bill and why are we all so concerned about this?" Knowing that I had agitated her about this matter really made my day. It seemed a lot of us had been calling and making noise. I applaud those of you who did and hope that when such matters come up again in the future, AND THEY WILL, that we will have an even bigger data base of members who will do just as we did with HB2243. On one level, we failed to stop this ridiculous bill in the house, but we did make noise!

On another matter, I would like to address Ms. Beltz's first paragraph in the HerPET-POURRI column last month. I felt that the writer she refers to was being positive and good-natured about the questionable "changes" and was merely claiming to be somewhat of a novice herper in need of an occasional good husbandry article. I fail to see this as "negative energy" put forth by this writer and the suggestion to "go elsewhere" will be and was interpreted as rather egotistical. This is not the way the CHS needs to be viewed and I sincerely hope this doesn't sour the good doctor who wrote the letter or others from wanting to be a member of this fine society. Most people do look to the *Bulletin* for good solid information, be it natural history or a captive-breeding update, and my guess is that the majority of our membership are indeed novice herpers just looking to connect with kindred spirits. Surely, those who have something to write about and contribute will do so. This person was obviously a working mom, who felt that some good husbandry articles would make the *Bulletin* more appealing to her. I doubt she has the time to write an article herself to help herself. I found that comment rather contradictory.

In all fairness to those who write for the *Bulletin*, myself included, it is an often thankless job but I would like to continue to believe we do it out of the goodness of our hearts and the abilities of our experiences, to enrich the lives of fellow herpetoculturists and hobbyists who simply enjoy being a part of an organization of kindred spirits.

I will always try to help out a fellow herper in need of good husbandry advice and if I can't help, I'll find someone who will. My cause is for the lives of the animals we care about.

Speaking of fellow herpers, I truly enjoyed speaking to the Central Illinois Herpetological Society as their guest speaker for April. They were the nicest bunch of people! In spite of the fact that some of the folks had an affinity for indigenous snakes, they were a most appreciative group willing to hear me talk endlessly about *Uromastyx* lizards in captivity. The talk also made me painfully aware that I needed to update my slide presentation! Several members of the CIHS will make the trek to Chicago to participate in ReptileFest and they did a nice job of mentioning the 'Fest in their society newsletter.

Well folks, that's it for April. . . . Remember to sign up for the CHS activities ASAP and as always, keep your herps happy and healthy!

Sincerely, Audrey Vanderlinden
E-mail: Uromastica@aol.com

Advertisements

American Federation of Herpetoculturists: A nonprofit national membership organization of herpetoculturists, veterinarians, academicians and zoo personnel involved in the captive husbandry and propagation of amphibians and reptiles. Membership includes highly acclaimed magazine, *The Vivarium*, dedicated to dissemination of information on herpetocultural accomplishments, herp medicine, breeding and maintenance, field studies and adventures, enclosure design and much more. AFH membership is \$26. Send information requests to: AFH-News, P.O. Box 300067, Escondido CA 92030-0067.

Custom-made laminated animal trading cards featuring YOUR animals. Show off your pet (reptile or other), advertise your animals for sale, great to use as business cards! For FREE sample, call Wildlife Educators, (815) 795-3959 or E-mail: <wei@mtco.com>.

For sale: rats and mice—pinkies, fuzzies and adults. Quantity discounts. Please send a SASE for pricelist or call Bill Brant, *THE GOURMET RODENT*, 6115 SW 137th Avenue, Archer FL 32618, (352) 495-9024, E-mail <GrmtRodent@aol.com>.

For sale: murine-pathogen-free rats and mice available in all sizes, live or frozen: pinkies, fuzzies, crawlers, small, medium and large. Frozen crawler mice in lots of 2000, \$.17 each. Also available, full grown hairless mice. FOB shipping point. Master Card accepted. Call (518) 537-2000 between 8:00 A.M. and 5:00 P.M. or write SAS Corporation, 273 Hover Avenue, Germantown NY 12526 for prices and additional information.

For sale: from **The Mouse Factory**, producing superior quality, frozen feeder mice and rats. New prices, new sizes, and now rats! Our mice and rats are vacuum-packed to greatly extend freezer life by reducing freezer burning and preserving vitamin and nutrient content. We feed our colony a nutritionally balanced diet of rodent chow, formulated especially for us, and four types of natural whole grains and seeds. Mice: pinkies, \$.25; fuzzies, \$.30; hoppers, \$.35; weanling, \$.40; adult, \$.45. Rats: starting with pinks at \$.40 each, to XL at \$1.80 each. Discount prices available. We accept Visa, MC, Discover or money orders. P.O. Box 85, Alpine TX 79831. Call us toll-free at (800) 720-0076 or visit our web site <www.themousefactory.com>.

For sale: from Bayou Rodents, excellent quality feeder mice and rats. Every size available. Pinks starting at \$20/100. Orders are shipped by overnight service Monday thru Thursday. We accept Visa, MasterCard and Discover. For more info, contact Rhonda or Peggy, (800) 722-6102.

For sale: **high quality frozen feeders**. Over a decade of production and supply. Seven sizes of mice available: small newborn pinks up to jumbo adults. Prices start at \$25 per 100. Feeders are separate in the resealable bag, not frozen together. Low shipping rates. Free price list. Kelly Haller, 4236 SE 25th Street, Topeka KS 66605, (913) 234-3358 evenings and weekends.

For sale: Herp bags—colors vary, translucent ripcord nylon, super lightweight, extremely durable construction with hot corners sewn in, double seamed. Custom sizes made upon request. Sizes: 46" × 14", \$7 each; 24" × 12", \$6 each; 24" × 6", \$5 each. Shipping fees, \$1 for first bag, \$.30 each additional bag. Nicole Lechowicz, 2511 S. Illinois Avenue, #104, Carbondale IL 62901, (618) 457-2783.

For sale: aluminum pistol-grip snake tongs—52" collecting tongs, \$60 postpaid; 24" cage tongs, \$50 postpaid. Tom Taylor, 1433 W. Huntington, Tempe AZ 85282, (602) 967-6265.

For sale: Neodesha reptile cages—4' with divider, elongated vents, litter dam, Flex-watt heat and 2' lights, \$165; 2' with glass door, elongated vents, \$35. All in excellent condition. (708) 361-5835.

For sale: **1999 prospective hatchlings:** Baird's ratsnakes, \$15 each; prairie kingsnakes, \$15 each; California kingsnakes, \$20 each; speckled kingsnakes, \$15 each; albino speckled kingsnakes, \$25 each; Mexican black kingsnakes, \$30 each; red milksnakes, \$30 each; Sinaloan milksnakes, \$35 each; Pueblan milksnakes, \$35 each; Mexican milksnakes, \$40 each; Queretaro or Ruthven's kingsnakes, \$50 each; Nuevo León kingsnakes (*thayeri*), \$65 each; gray-banded kingsnakes, \$50 each; Durango mountain kingsnakes (*greeri*), \$75 each; Arizona mountain kingsnakes, \$125 each; prairie/speckled crosses, \$20 each. **Breeders, available May–June:** one male and one female Baird's ratsnakes, \$100; one male and one female *annulata*, \$200; one male and two female prairie kings, \$135; one male and one female albino speckled kings, \$150; one male and one female Mexican black kings, \$175; one male and three female red milksnakes, \$250; two female Sinaloan milksnakes, \$175; one male and two female Pueblan milksnakes, \$250; one male and one female Ruthven's kingsnakes, \$250; one male and one female Nuevo León kingsnakes (*thayeri*), \$250; one male and two female Durango mountain kingsnakes, \$300; one male and one female *mexicana mexicana*, \$135; two male and two female prairie/speckled crosses, \$85/pair; one male and two female California kings, \$150. Steve Mitchener, (405) 748-6566 after 6:00 P.M. Central Time. [OK]

For sale: Great snakes, great service. Send SASE for list. Applegate, P.O. Box 338, Campo CA 91906, (619) 478-5123. E-mail: <applesnake@juno.com>. Website: <www.applegatereptiles.com> Thank you, call me.

For sale: **Adults:** male het ghost, \$60; black king, \$55; male *thayeri* (milksnake phase), \$100; pair of ball pythons, \$175/pair; Indonesian bluetongue, \$55; *Rhacodactylus auriculatus*, c.b. '98, \$150; *Phelsuma madagascariensis grandis*, c.b. '98, \$20. Flexwatt heat tape, \$2.50/ft, \$5 each connection. Steve Bostwick (515) 274-4580, E-mail <liasis@juno.com>. [IA]

For sale: baby (c.h.) Solomon isle ground boas, just getting them to feed on pinkies, \$50 each or \$90/pair. Wally Maluchnik, (773) 721-8036.

For sale: jungle carpet pythons. 4½–5' male, great feeder, jet black and bright yellow, proven breeder, \$350; 3', 2-year-old male, "Lazik" bloodline, awesome color, \$250; 8-month-old female, choice, held back from last year, perfect specimen, vertebral stripe, great eater, \$175.

Mark Petros, Strictly Serpents, (847) 854-3259 home, (847) 854-2992 work.

For sale: Send SASE to CRC, P.O. Box 0731, Las Vegas NV 89125-0731 for brochures and list of species available. Limited bookings available for guided tours of herpetological collection sites in Nevada. Call/fax (702) 450-0065. URL <http://www.herp.com/crc/> E-mail <crsafetie@aol.com>.

Tours: Adventure tours to Madagascar! Join **Bill Love** seeing and photographing fauna and flora, heavily herp-biased, across the world's least known mini-continent. Maximum fun & photo ops assured on every trip. Contact him at: BLUE CHAMELEON VENTURES, P.O. Box 643, Alva FL 33920. TEL: (941) 728-2390, FAX: (941) 728-3276, E-MAIL: <blove@cyberstreet.com>.

Tours: **Road-riding in Costa Rica!** Treat yourself to the trip of a lifetime! Learn about tropical herps, find them, photograph them, see where they live. **Greentracks, Inc.**, offers the best herpetological tours led by internationally acclaimed herpetologists and herpetoculturists. See the Amazon, visit cloud forests, experience the world's greatest rainforest, super sunsets and good company. Call (800) 9-MONKEY.

Video: *Rattlesnake Hunting*, a 60-minute video by a 30-year veteran collector. Don't miss this one! It's as close to being in the field as you can get. (Not a slick commercial production.) Send check or money order for \$19.95 plus \$3 postage & handling to: D. Wheeler, 2705 Sunset Trail, Riverwoods IL 60015. Allow 4–6 weeks for delivery.

Wanted: black rat snake, preferably c.b. young adult, to be used for display/educational programs at the Wildlife Discovery Center (Lake Forest Recreation Dept.). Rob Carmichael, (847) 615-4388, E-mail: <Carmichr@citylf.lfc.edu>.

Wanted: breeder size corns (all and any morphs). Also looking for female Cal. king breeder size. Wally Maluchnik, (773) 721-8036.

Wanted: big-headed turtles; mata mata turtles; Mexican giant mud turtles (*Staurotypus triporcatus*); exceptionally large common snappers (45 lbs. & up); large alligator snappers (over 90 lbs.); spectacled caiman from Trinidad, Tobago and Surinam; dwarf caiman; smooth-fronted caiman; albino turtles (except red-eared sliders). Walt Loose, (610) 926-6028, 9:00 A.M. – 1:00 P.M. or after 11:30 P.M. Eastern Time.

Advertisements (cont'd)

Wanted: unusual/aberrant garter snakes and unusual/aberrant/large rubber boas. Scott, (919) 934-0110, EST. [NC]

Line ads in this publication are run free for CHS members — \$2 per line for nonmembers. Any ad may be refused at the discretion of the Editor. Submit ads to: Michael Dloogatch, 6048 N. Lawndale Avenue, Chicago IL 60659, (773) 588-0728 evening telephone, (312) 782-2868 fax, E-mail <MADadder0@aol.com>.

CHS Board Member Profile Gary Fogel – Treasurer

Born in Chicago, Gary has always had an interest in reptiles and amphibians. While growing up, his parents never discouraged this interest and he was allowed to keep the usual range of scaly animals (those that were available back then) except for snakes, which his father didn't particularly care to have in the home environment. Gary joined the CHS in 1985, when he ventured to a Chicago Academy of Sciences Herpetological Weekend. He has been attending meetings ever since. For years he would come and go each month with nary a word spoken. In 1990, this all changed, as he was put in charge of the CHS bulletin board and also became one of the original members of the fledgling lizard group. (Both are now nostalgic memories.) Soon after, a resignation on the board of directors resulted in his being appointed to a position as member-at-large. In 1992 he was voted Treasurer, partly because at the time he needed a challenge in his life, and also because the mere mention of this board position had people "heading for the hills" to avoid being asked to run. After much CHS pressure, Gary relented and the treasury has been his ever since. Since taking office, he has upgraded the treasury report into the computer age, thus eliminating the need for that plastic green visor cap and manual-arm adding machine. He maintains the CHS funds much like a pit bull with a knotted sock. No reckless spending here. His reptilian interests are primarily with saurians, with a smattering of snakes and amphibians thrown in for good measure. For the last decade, Gary has been working exclusively with *Cordylus* and *Oedura* species. This work resulted in a presentation at the 1995 Midwest Herpetological Symposium, held in Chicago. He has also received two merit awards from the CHS, in 1992 and 1998, for outstanding achievement and contributions, but is still *way too young* to receive the lifetime achievement award. He also maintains all the corresponding publications for the society in his basement. Gary has a degree from the School of the Art Institute, which helped him in planning and designing various displays for ReptileFest, the event he has co-chaired for the last two years. The following items *may* or *may not* be true about him:



- was president of the wood-burning club in high school
- was inspirational model for the smiley face
- invented the poodle skirt
- holds world's record for continuous doodling at board meetings
- was one of the original "Our Gang little rascals"
- changes hair color more often than Dennis Rodman
- has a potato in his pantry that resembles Agnes Moorehead
- hobnobbed with Andy Warhol one night at Studio 54
- suffers from PCS (pessimistic cynical sarcasm)
- built a crystal radio out of a 1938 Duesenberg automobile and tin cans
- prone to vast exaggeration while writing the above 10 items (maybe).

Hey kids! Be sure to collect all the board of directors profiles to come! Mix and match! Trade them with your friends! It's loads of fun for the entire family!

News and Announcements

FUTURE BOARD MEETINGS

The dates for the next two meetings of the Board of Directors of the Chicago Herpetological Society are May 14 and June 18. Meetings are generally held at 7:30 P.M. in the Administration Building of the North Park Village complex, 5801 N. Pulaski in Chicago. For more information and to verify the dates and location, please contact Audrey Vanderlinden at (773) 836-2477 or E-mail <uromastica@aol.com>.

PICNIC

Mark your calendars for Sunday, August 22. The annual CHS picnic will take place out near O'Hare Airport, in the Catherine Chevalier Woods. If you'd like to help out with the games and other goings on, please contact Audrey at (773) 836-2477 or E-mail <uromastica@aol.com>. More information will be forthcoming.

1999 INTERNATIONAL HERPETOLOGICAL SYMPOSIUM

The 23rd annual meeting of the International Herpetological Symposium will be held July 28-31, 1999, at the Hotel Hanalei in San Diego, California. The theme for this year's gathering is "Reproduction and Natural History." The hosting organizations are the San Diego Zoo and the San Diego Herpetological Society. The keynote speaker will be Dr. Robert Inger of the Field Museum of Natural History, author of many books including *Living Reptiles of the World* and *The Natural History of Amphibians and Reptiles in Sabah*. His topic will be "Herpetology of Borneo, an Overview."

Other scheduled speakers, together with their affiliations and topics, are: Charles Daugherty, Ph.D. (Victoria University of Wellington, New Zealand), tuatara propagation; Dante Fenolio (University of Oklahoma), Brazil's tropical frogs; Guenther Kohler, Ph.D. (Senckenberg Museum, Germany), new spiny-tailed iguanas from Central America; Joe Slowinski, Ph.D. (California Academy of Sciences, San Francisco), Burmese herpetology; Bill Love (Blue Chameleon Ventures, Florida), Madagascan reptiles and amphibians in captivity; Anita Malhotra, Ph.D. (University of Wales, United Kingdom), new research on pit vipers; Christopher Raxworthy, Ph.D. (University of Kansas), the multitude of new species from Madagascar; Bernd Eidenmueller (varanid breeder, Germany), monitor breeding over several generations; Jerry Conway (private breeder, Florida), breeding and diversity of Pacific boas, genus *Candoia*; Aaron Bauer, Ph.D. (Villanova University), African fat-toed geckos; Susan Donoghue, D.V.M. (editor, *The Vivarium*), tortoise nutrition and Editors' Workshop; Phillip Samuelson (editor, *Reptiles*), Editors' Workshop; Tom Mazonlig (editor, *Reptile Hobbyist*), Editors' Workshop; Robert Sprackland, Ph.D. (Young Forest Company, California), on something varanid; Jeff Ettling (Saint Louis Zoo, Missouri), breeding and care of vipers; Carlos Gutierrez (Guadalajara Zoo, Mexico), recent developments at Mexican zoos; with notes on the biology, conservation and captive maintenance of *Crocodylus moreleti*; Philippe de Vosjoli (Owner, Advanced Vivarium Systems, California), natural history, care and breeding of *Rhacodactylus leachianus*; Bruce Weissgold (U.S. Fish and Wildlife Service, Washington, D.C.), CITES policy overview; Marshall Meyers (Pet Industry Joint Advisory Council), regulating herpetoculture, an overview; Jeff Barringer (Acting President, National Reptile and Amphibian Advisory Council), NRAAC and its role.

The agenda also includes four workshops. At the Editors' Workshop editors of the major herpetocultural magazines will present their publications' focus and writers' guidelines, and help explain how to write and submit articles for publication. Other workshops will be "Ask the Veterinarian," "Legislation and Regulation of Herpetoculture," and "Caribbean Iguanid Breeding and Conservation." Other planned activities are a behind-the-scenes tour of San Diego Zoo's herpetological facilities, with a barbecue at the zoo, a poolside luau-social at the Hotel Hanalei, an icebreaker social at the Hotel Hanalei on evening of July 28, and an auction.

Registration is \$125 if paid before July 12. Send fee to David Hulmes, 361 Van Winkle Avenue, Hawthorne, NJ 07506, (973) 427-0768. You must make your own hotel reservation directly with the Hanalei Hotel, 2270 Hotel Circle North, San Diego, CA 92108, (619) 297-1101. For general information, contact Stan Draper, P.O. Box 16444, Salt Lake City, UT 84116, E-mail: <sdraper@npap.com>.

MOVING??

Please let us know in plenty of time of any change in your mailing address. The *Bulletin of the Chicago Herpetological Society* is sent to our U.S. members by bulk-rate third class mail. This means that the U.S. Post Office will not forward your *Bulletin* with the rest of your mail. This is so even if you make a special request that your magazines be forwarded (such a request only applies to second class mail).

UPCOMING MEETINGS

The next meeting of the Chicago Herpetological Society will be held at 7:30 P.M., Wednesday, April 28, at the Field Museum of Natural History, Roosevelt Road at Lake Shore Drive, in Chicago. The title of the program will be "The Herpetofauna of Thailand and Laos." The speakers will be **Tanya Chan'ard**, **Brian Stuart** and **John Murphy**, all of whom have been conducting research in Southeast Asia for the Field Museum.

Speaking at the May 26 meeting will be **Tom Tynning**, staff herpetologist for the Massachusetts Audubon Society. Tom's program deals with "Uncommon Stories about Common Amphibians and Reptiles."

We are required to use the entrance on the west side of the museum. **We are allowed to use the free parking lot to the west of the museum. Entrance to this lot is from McFetridge Drive, the wide street just to the south, between the museum and Soldier Field.** Public transportation is an option: the Roosevelt Road (12th Street) bus goes directly to the museum, thus providing a connection with the el and subway. This bus service runs until 11 P.M.

The Chicago Turtle Club

The Chicago Turtle Club will meet on Sunday, April 25, May 23 and June 27, 1:00 – 3:30/4:00 P.M., at the North Park Village Nature Center, 5801 N. Pulaski, in Chicago. Meetings are informal. Questions, children and animals are welcome. Parking is free and there is no admission. April is our Touch a Turtle and Tickle a Tortoise Day. Set-up begins at noon, public is admitted at 1:00, show ends at 3:30. For more information call Lisa, (773) 508-0034 or visit the CTC web site: <<http://www.geocities.com/~chicagoturtle>>.

HERP PARASITOLOGY WORKSHOP

The Chicago Herpetological Society will offer a workshop on herp parasitology at 10:00 A.M. Saturday, May 29, at the Grove Nature Center, 1421 Milwaukee Avenue, in Glenview. The session will be conducted by Cheryl Roge, D.V.M. Because there are a limited number of microscopes available, the class will be limited to 12 participants. Therefore you must register beforehand if you wish to attend. Sign up by calling Audrey Vanderlinden at (773) 836-2477 or via E-mail to <uromastica@aol.com>. Bring fresh fecal samples from your herps. You will learn about parasites and how they affect the health of your herps. You will be able to view parasites under a microscope and learn to recognize infestations. This is an informative and fun class. The Grove is a beautiful nature center to visit and explore, so plan to stay after and tour the grounds. The workshop will last approximately two hours.

LOUISVILLE ZOO TRIP

It's that time of year again! Sign up for the CHS zoo trip—this year to the Louisville Zoo on Saturday, June 19. This is a great opportunity to enjoy a day at the zoo with fellow CHS members. Members of the Louisville Herpetological Society will join us this year as well. Meet new herp friends as we go behind the scenes with the keepers of the reptile exhibits and learn about the workings of a world class zoo. The newest additions to the zoo's herp collection are a pair of young Komodo dragons! The bus will depart at 6:00 A.M. from the vicinity of the North Park Village Nature Center at Pulaski and Bryn Mawr. Parking will be along the south side of Bryn Mawr Avenue, same as last year. We will arrive at the zoo around 11:00 A.M. and depart at 5:00 P.M. We will make a fast food dinner stop on the way home. Snacks and sack lunches are encouraged or you can buy food at the zoo. The cost is \$46.50 per participant, covering round-trip bus fare on an air-conditioned luxury motorcoach complete with VCRs, and admission to the zoo. Seating is limited, so sign up early! Paid reservations are required. Make checks payable to the CHS. For reservations and further details, call Audrey Vanderlinden at (773) 836-2477 or E-mail <uromastica@aol.com>.

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